



**MONTROSE COUNTY**  
C O L O R A D O

# **Pre-Disaster Hazard Mitigation Plan**

**September 2008**

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## **Introduction**

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Montrose County, one of the counties on the Western Slope of Colorado, has diversity in the geography, economic base and population. The potential hazards are one of the diverse components of this County. This plan discusses the possible hazards and mitigation techniques. This plan is designed with the intent to reduce impacts by better protecting lives, property and the environment.

## **Executive Summary**

The Montrose County Pre-Disaster Hazard Mitigation Plan is representative of a collaborative effort among departments within Montrose County, State of Colorado, local jurisdictions and emergency responders. The following report encompasses the best efforts of the Pre-Disaster Mitigation Plan's participants to comply with guidance from the State of Colorado, Division of Emergency Management, and the Federal Emergency Management Agency. While it is believed to be fully responsive to the requirements of the State and Federal governments, it is understood and acknowledged by all participants that the disaster mitigation planning process is dynamic and requires periodic review, analysis and amendment.

## **Purpose, Goals and Objectives**

The purpose of this Plan is to

- ☐ Protect life, safety and property by reducing the potential for future damages and economic losses that result from natural and human-caused hazards;
- ☐ Support future grant requests for pre- and post-disaster initiatives;
- ☐ Speed recovery and redevelopment following future disaster events;
- ☐ Demonstrate Montrose County's commitment to hazard mitigation; and
- ☐ Comply with federal and state legislation and guidance for local hazard mitigation planning.

The main element of this plan is the recommended pre-disaster mitigation actions designed to help minimize the potential negative impacts that could be caused by the prioritized hazards. The specific goals and objectives for each hazard have been established to produce measurable benefits to County residents. These actions have been justified and prioritized using accepted practices and methods that are outlined within this document.

## **Scope of the Plan**

While the Planning Team looked at all possible natural hazards, the Plan is focused on those that pose high and moderate risks to Montrose County residents. Those with higher priorities for mitigation techniques and discussion have the potential to affect the health and safety, impact emergency response capability greatly or create distress to property and/ or critical infrastructure.

The Planning Team considered many hazards pursuant to the compilation of this plan. The hazards and mitigation actions detailed herein are those prioritized by the Planning Team with input from the public, Board of County Commissioners and the city/town councils.

## **Project Participants**

Those who participated in developing this plan include members from professional and volunteer agencies that handle emergency preparedness, response and recovery throughout Montrose County as well as Montrose County, City of Montrose, and Town of Olathe employees. The towns of Nucla and Naturita were invited; however, nobody from either jurisdiction attended the meetings, replied to emails or commented on this plan. Members of the public contributed to the Plan development by being:

- ☐ invited to the meetings
- ☐ able to complete a survey, which was posted on the Montrose County website, that allowed them to rate hazards within the County
- ☐ able to read the draft document online and at the libraries
- ☐ able to comment on these documents
- ☐ invited to the public hearing before the Board of County Commissioners in October 2008

## **Disaster Mitigation Act of 2000**

To better protect the United States from natural occurring disasters, the United States Congress passed the Robert T. Stafford Disaster Relief and Emergency Assistance Act, enacted as the Disaster Mitigation Act of 2000 (DMA 2000). With this legislation, there is renewed emphasis on pre-disaster mitigation of potential hazards. The most relevant to state and local governments under DMA 2000 are its amendments to Sections 203 (Pre-Disaster Hazard Mitigation) and 322 (Mitigation Planning).

Section 203 establishes a *National Pre-Disaster Mitigation Fund* to support a program that will “provide technical and financial assistance to state and local governments to assist in the implementation of pre-disaster hazard mitigation measures that are cost-effective and designed to reduce injuries, loss of life and damage and destruction of property, including damage to critical services and facilities under the jurisdiction of the state or local governments.”

Section 322 of DMA 2000 provides the following approach to mitigation planning:

- ☐ Establishing a requirement and delivering new guidance for State, Local and Tribal mitigation plans;
- ☐ Providing for states to receive an increased percentage of Hazard Mitigation Grant Program (HMGP) funds if, at the time of the declaration of a major disaster, they have in effect an approved State Mitigation Plan that meets criteria defined in the law; and

- ☐ Authorizing up to 7 percent of the HMGP funds available to a state to be used for development of state, local and tribal mitigation plans.

Montrose County applied for and received funds from the Federal Emergency Management Agency Pre-Disaster Mitigation Grant program planning, to support the development of this Pre-Disaster Hazard Mitigation Plan.

### **Authority**

The Plan is developed in accordance with current State, Federal and Local rules and regulations including:

- ☐ Section 332, Mitigation Planning of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390);
- ☐ FEMA's Interim Final Rule published in the Federal Register on Feb. 26, 2002 at 44 CFR Part 201;
- ☐ The State of Colorado, Division of Emergency Management, Office of the Governor;
- ☐ Montrose County, Colorado Resolution No. 25-1999; and
- ☐ Montrose County, Colorado Resolution No. 47-2003

This Plan will also be adopted by Montrose County Commissioners with a Resolution after the plan has been reviewed and deemed approvable by FEMA. A draft Resolution is included as Attachment #1.

## **Project Planning and Methodology**

This Pre-Disaster Hazard Mitigation Plan was created by a Planning Team. Members of the team were invited to the first meeting by an email sent by the Emergency Management Coordinator. The coordinator also made the announcement of the first Hazard Mitigation planning meeting at the Local Emergency Planning Committee. Updates were provided to all members of both groups by email and at subsequent meetings.

### **Meetings**

The first meeting was June 4, 2008. Agendas for this and subsequent meetings are in Attachment #2 to this Plan.

At the first meeting, the following actions occurred:

- ☐ All potential hazards were listed
- ☐ Hazards were grouped into categories
- ☐ Hazards were rated
- ☐ Members of the Planning Team drew on a map where populations met risk
- ☐ Homework assignments were given
  - History of hazards in Montrose County
  - Other plans that discuss the hazard
  - Maps
  - Populations at risk
  - Values at risk

At the second meeting, the following actions were taken by the Planning Team:

- ☐ Probability of each hazard
- ☐ Severity of each hazard
- ☐ Impact of the hazard
  - Economic
  - Social
  - Historical
  - Environmental
- ☐ Mitigation strategies for each hazard were identified
- ☐ Homework assignments were reviewed

The focus of the third meeting was to use the STAPLEE method to rate the mitigation strategies. The Planning Team evaluated each mitigation action based on Social, Technical, Administrative, Political, Legal, Economic, and Environmental repercussions.

An additional meeting was attended by several County elected officials and staff. The focus of that meeting was the *Geologic Hazards Mapping Project for Montrose County*,



*Colorado.* This report was prepared as part of this grant application by the Colorado Geological Survey. A synopsis of the report is included in this Pre-Disaster Hazard Mitigation Plan, and the plan in its entirety can be found online at the Montrose County website.

## Planning Team

The Plan was developed by the following people:

<b>Title</b>	<b>Agency</b>	<b>Tasks assigned/ completed</b>
Assessor	Montrose County	<input type="checkbox"/> Values at risk <input type="checkbox"/> Increases in values
Chief	Montrose Police Department	<input type="checkbox"/> Historical Information <input type="checkbox"/> Interviewed
Chief	Paradox Volunteer Fire Department	<input type="checkbox"/> Interviewed via email about hazards, mitigation priorities
Chief	Olathe Police Department	<input type="checkbox"/> Historical Information <input type="checkbox"/> Interviewed
Chief	Nucla/Naturita Volunteer Fire Department	<input type="checkbox"/> Historical Information <input type="checkbox"/> Interviewed
Deputy Chief	Montrose Fire Protection District	<input type="checkbox"/> Historical Information <input type="checkbox"/> Interviewed
Director	Montrose County Health & Human Services	<input type="checkbox"/> Participated in planning meetings
Director	Montrose County Land Use	<input type="checkbox"/> Development Trends <input type="checkbox"/> Reviewing plans for other information <input type="checkbox"/> Provided subdivisions where growth is occurring
District Forester	Colorado State Forest Service	<input type="checkbox"/> Provided wildfire Information
ED Director	Montrose Regional Hospital	<input type="checkbox"/> Reviewed the plan <input type="checkbox"/> Discussed plan at Hospital Safety Committee
Emergency Management Coordinator	Montrose County	<input type="checkbox"/> Wrote plan <input type="checkbox"/> Facilitated meetings
Emergency Preparedness Coordinator	Montrose County Health & Human Services	<input type="checkbox"/> Note taker at meetings
Engineer	City of Montrose	<input type="checkbox"/> Assisted with prioritization of mitigation projects
Engineer	Montrose County	<input type="checkbox"/> Review other plans for hazard information <input type="checkbox"/> Historical information <input type="checkbox"/> Participated in planning meetings

Environmental Health Officer	Montrose County Health & Human Services	<input type="checkbox"/> Participated in planning meetings <input type="checkbox"/> Provided Hazardous Materials (Uranium) information
Flood Plain Administrator	Montrose County Land Use	<input type="checkbox"/> Provided information on flood plains
Mitigation Specialist	State of Colorado/ Division of Emergency Management	<input type="checkbox"/> Read drafts <input type="checkbox"/> Facilitated first meeting
Planner	City of Montrose Community Development	<input type="checkbox"/> Provided information on other plans
Public Works Director	Town of Olathe	<input type="checkbox"/> Attended meetings
Regional Planner	State of Colorado/ Division of Emergency Management	<input type="checkbox"/> Interviewed for historical hazards
Sheriff	Montrose County	<input type="checkbox"/> Interviewed for historical hazards
Staff	Colorado Geological Survey	<input type="checkbox"/> Compiled geological hazards information <input type="checkbox"/> Mapped geological hazards <input type="checkbox"/> Presented information in working group to Montrose County staff and interested parties
State Dam Engineer	Division of Water Resources	<input type="checkbox"/> Interviewed for historical hazards <input type="checkbox"/> Participated in planning meetings <input type="checkbox"/> Provided mitigation actions
Supervisor	Montrose County Road & Bridge	<input type="checkbox"/> Interviewed <input type="checkbox"/> Historical hazard information
Supervisor	Olathe Public Works	<input type="checkbox"/> Participated in planning meetings
Technician	Montrose County GIS	<input type="checkbox"/> Maps
Undersheriff	Montrose County	<input type="checkbox"/> Interviewed for historical hazards
Volunteer	Montrose Sheriff's Posse	<input type="checkbox"/> Interviewed for historical hazards

Volunteer	Citizen Emergency Response Team	<input type="checkbox"/> Discussion of hazards at CERT meeting; responses back to Emergency Management Coordinator
Volunteer	ARES	<input type="checkbox"/> Historical fires <input type="checkbox"/> Participated in one planning meeting
Volunteer	Olathe Volunteer Fire Department	<input type="checkbox"/> Interviewed for historical hazards
Volunteer	RACES	<input type="checkbox"/> Interviewed for historical hazards
Volunteer	Montrose Historical Society	<input type="checkbox"/> History of Montrose County <input type="checkbox"/> History of hazards
Table 1: Planning Team		

This team includes representatives from several communities and agencies within Montrose County. In addition to the jobs listed, each person reviewed the plan and offered comments. Most of the participants attended the meetings and completed homework assignments as well as participated in discussions at public meetings and email. The Emergency Management Coordinator also interviewed several members of the team individually.

## Public Participation

Prior to the first meeting, a press release was published in the local newspapers and posted on the Public Notices board in Montrose County Administration. A second article was posted in the local newspapers directing the public to the Montrose County website to fill out a survey. A copy of this survey is Attachment #3. A total of 87 surveys were returned. The results are also included in Attachment #3.

The intent of the survey was to sample a wide variety of stakeholders within the resources available. Although this survey was not conducted to scientific standards, the responses from community members were consistent with those of the Planning Team. This input was considered valid. The survey allowed members of the public to rank certain hazards by risks. The public ranked wildfire as the most significant threat to Montrose County residents.

Other ways the public was involved in the planning process:

- ☐ Copies of the Plan staged at public libraries and other government buildings
- ☐ Articles in the local newspapers
- ☐ Information about the plan and copies posted on the County website

- ☐ Public meetings prior to the adoption of any Plan updates
- ☐ Comments made from any of these sources incorporated into the Plan as appropriate

## Hazard Identification Process

The process of identification of the hazards included a roundtable discussion of the possible hazards which can occur throughout the United States and narrowing those down to ones which have the potential to happen in Montrose County. All of the hazards discussed are listed in the plan. This discussion was part of the first meeting.

## Risk Assessment Process

The process of identifying the risks was a roundtable discussion of the prioritized hazards, which were discussed at the first meeting. Those hazards included and were rated:

Prioritized Hazard	Probability
Severe Weather	High
Wildfire	High
Floods	Medium
Geological Hazards	Medium
Hazardous Materials ~ Uranium	Low
Table 2: Prioritized Hazards	

## Mitigation Planning

The risk assessment process identified hazards considered a priority within Montrose County, and the Planning Team developed and documented goals and objectives to guide mitigation planning efforts. The team also developed and evaluated strategies for implementing justified and prioritized mitigation actions. These goals and objectives were first evaluated for reducing impacts to better protect lives, property and the environment.

The Montrose County Pre-Disaster Hazard Mitigation Planning Team conducted research, reviewed other plans and interviewed experts to collect potential mitigation actions for these prioritized hazards. Potential mitigation actions and strategies then were evaluated using the FEMA-recommended STAPLEE methodology, which seeks to identify options acceptable and appropriate for the community. STAPLEE evaluates mitigation options by comparing them to these criteria:

- ☐ Social acceptance
- ☐ Technical merit
- ☐ Administrative support
- ☐ Political support
- ☐ Legal support

- ☐ Economic viability
- ☐ Environment

Mitigation alternatives were also evaluated for cost-benefit and compared to current mitigation projects already in process. The results of this process defined the mitigation actions included in the plan submitted for adoption by Montrose County.

Implementation strategies for prioritized mitigation actions were developed at a strategic level to guide ongoing planning efforts. All targeted mitigation strategies were assigned points of contact.

## **Review of Current Plans, Studies and Reports**

To validate potential mitigation options and to coordinate outcome from the Plan with existing mitigation strategies and plans, the Planning Team reviewed hazard studies, emergency planning reports and other documents currently covering prioritized hazards within Montrose County. These existing plans and documents are reviewed and summarized in the Hazard Mitigation section of this document.

Some of the plans reviewed were originally drafted to “maintain or improve safety from fire, flood or other potential disasters,” according to the Montrose County Subdivision Regulations. The City of Montrose’s Comprehensive Plan was written for similar reasons, stating it is charged to address “promotion of safety from fire, flood waters and other dangers.” One of the Guiding Principles for the City’s Comprehensive Plan is to “provide public services and facilities necessary for health, safety and welfare.” One of the goals outlined in the Comprehensive Plan is to keep “our community attractive and safe.”

Most plans reviewed are incorporated into this Pre-Disaster Hazard Mitigation Plan when mitigation techniques that specifically address safety of lives and property are mentioned. Since the Montrose County Master Plan is currently being revised, this plan was only reviewed and not discussed within the Pre-Disaster Hazard Mitigation Plan.

## **Plan Adoption and Maintenance**

The Plan will be adopted by Montrose County with a Resolution after the Plan has been deemed approvable by FEMA. A draft resolution is attached. At this time, the Plan is not multi-jurisdictional; therefore, it will not be adopted by other communities within the County. At the time of the first update, the Plan will be made multi-jurisdictional.

This plan shall be evaluated yearly by the Montrose County Emergency Management Coordinator, and updated by all participating agencies once every five years. If a disaster occurs that significantly affects Montrose County residents, the plan will be updated. That update will occur as soon as possible after the event, and not to be longer than 12 months. Routine maintenance will include adding or removing projects from the list. In the event of significant modifications to the Plan, it will be resubmitted for approval by the Board of County Commissioners.

## Community Profile

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Montrose County is diverse with several distinct communities and geographic areas. Montrose County encompasses 2,247 square miles. Of that, 1,573 square miles are owned by public agencies.

Bureau of Land Management	992 square miles
United States Forest Service	523 square miles
National Park Service	43 square miles
Colorado Division of Wildlife	15 square miles
<b>Total</b>	<b>1,573 square miles</b>

Table 3: Land Ownership

A land ownership map is included in Attachment #4.

## Geography

Montrose County is located approximately 300 miles from Denver on the Western Slope of the Continental Divide. At the lowest point of the County, the elevation is 4,700 feet and at the highest point the elevation is 11,453 feet.

The City of Montrose is approximately 300 miles from the Denver area in the center of the Uncompahgre Valley. The City serves as a main thoroughfare to Telluride, Grand Junction, Ouray, and the Black Canyon of the Gunnison National Park. It is the regional shopping center for many of the residents in Montrose and neighboring counties.

The Town of Olathe is located half a mile off of Highway 50 about 10 miles north of Montrose. The Town is largely comprised of people in the business of agriculture, and the retail stores reflect that.

On the other side of the County, it is commonly known as the West End. The Towns of Nucla and Naturita are located there. The Town of Naturita is situated 85 miles from Montrose, and the Town of Nucla is another five miles beyond that. To get to these west end towns, unless traveling over the unpaved roads on the Uncompahgre Plateau, one must travel through San Miguel and Ouray counties. The Community of Paradox is located 30 miles, or 50 minutes from Nucla. This 115-mile trip from Montrose takes more than two and a half hours. Paradox is located close to the Utah border. The Community of Bedrock, also located close to the Utah border, is 108 miles from Montrose, or a two and half hour drive. The 40-minute drive from Nucla is a 25-mile trip. The West End population is rural based. The uranium mines are starting to become operational, and many people have ties to the mining industry.

The Community of Maher is also located in Montrose County. It is located in the northeastern corner of the County, along the rim of the Black Canyon. One has to either

drive through Gunnison County or Delta County to reach the area that is home to a small number of Montrose County residents who ranch or are retired.

The surrounding area includes Grand Mesa to the north, and the San Juan Mountains to the south. The Uncompahgre Plateau divides the Montrose County in half. The eastern portion is further divided by the Gunnison River and Black Canyon.

A map of these Montrose County communities is included in Attachment #4.

## Demographics

Montrose County's current population, according to the Colorado Economic and Demographic Information System, is estimated at 40,923. The forecasted population for 2010 is 43,875.

From this source, the estimated 2006 population for each area is:

Montrose	16,486
Naturita	675
Nucla	753
Olathe	1,766
Unincorporated Area	19,223
<b>Total</b>	<b>38,903</b>

Table 4: 2006 Population

## History

At first glance Montrose County appears to be a small agricultural center; however, both the City and County of Montrose can lay claim to history that includes the facets of indigenous cultures, range wars, exploration and evidence of a tenacity that has ensured its survival beyond all expectations.

The town of Montrose, originally named "Pomona," was incorporated May 2, 1882, but the human history of the area begins several hundred years before with the settlement of the Tabeguache and Uncompahgre Ute Indians on the central Western Slope of present-day Colorado. These were nomadic tribes, and swept across vast acres of plains and valleys in their quest for game.

In 1765 a Spanish soldier by the name of Don Juan Rivera ventured as far north as present-day Olathe. Rivera stayed long enough to carve his initials into a tree and then, apparently not finding much reason to tarry in the wilderness, returned to his New Mexican home.

The next Caucasians of note to enter the area were the Franciscan friars Francisco Dominquez and Silverstre de Escalante in 1776. Looking for an inland route from Santa Fe to California, they traveled thousands of miles against incredible odds and explored an



extensive portion of present Montrose County, all the while logging their adventures, which included those with the locals for posterity.

For the next half-century, the Indians remained in relative isolation. By the second quarter of the nineteenth century; however, fur trappers and traders began to enter the area more frequently. As the land became more attractive and valuable, the Indians began to lose their traditional domicile. Beginning with the initial treaty of 1863, the United States government, and those seeking land for various reasons led to the expulsion of the Utes from Western Colorado in 1881. This was in spite of efforts by Chief Ouray.

Mining in the West End of Montrose County is what helped the towns of Nucla, Naturita, Paradox, Uravan and Bedrock to develop, beginning in the 1880s. By 1917, Standard Chemical's mill in Uravan was producing two-thirds of the United States radium.

Further expansion of Montrose County was facilitated by the railroads. Ranching and farming were soon common. These ranches and in particular orchards were used to supply the nearby mining towns. The location of Montrose provided a link between the mountain towns of Ouray, Silverton, Telluride and the West End communities, and the needed supplies. Dave Wood, one noted entrepreneur in the area, capitalized on this and built a road over the Uncompahgre Plateau to Telluride. This road is still used today; however, only in the summer months.

As Montrose grew, the need for it to become its own County became evident. In 1883 it was split from Gunnison County. This led to a need for more water. Canals were dug from the Uncompahgre River in an attempt to provide irrigation to the orchards and farms. The first and most notable ditch was built by O.D. "Pappy" Loutsenhizer, one of the two original town founders. Even with the extensive ditch system historian Wilson Rockwell in his *Uncompahgre Country* states that "water from this source could only irrigate 10,000 acres of land ... while there are about 185,000 acres of irrigable land in the Uncompahgre Valley. By [1890] 65 percent of this land was without water" (87).

With the Gunnison River nearby, it was only a matter of time before enterprising Montrose citizens began constructing a tunnel through the Black Canyon in order to divert water to the Valley. The first survey crew, a band of untrained and ill-equipped farmers and ranchers attempted an excursion down the river in 1901. After three weeks the crew was forced to turn back. This venture raised support for tunnel construction.

After securing federal funding, construction of the Gunnison Tunnel began in 1905 and was completed in 1909. President William Howard Taft cut the ribbon that inaugurated the first flow of water from the Gunnison River to the Montrose County farms.

As the famers became more content, dissension grew between the cattle ranchers and the sheep ranchers. An influx in sheep ranches at the end of the century caused range wars which continued for the next quarter of a century. At least one Montrose citizen was shot and killed over territorial disputes and families waged feuds that lasted generations.

By the end of the 1920s, Montrose had become an established community. Although still primarily an agricultural center, Montrose has seen the introduction of such amenities as cars, movie theatres and downtown neon signs.

During World War II, the Uravan area provided uranium for the Manhattan Project. Vanadium was also mined here and was used to harden steel for the war effort. Production was stimulated between 1948 and 1962 when the Atomic Energy Commission guaranteed a minimum price for uranium. Because “of the wartime secrecy the Manhattan Project would only publicly admit to purchasing the vanadium, and did not pay the uranium miners for the uranium ore (in a much later lawsuit, many miners were able to reclaim lost profits from the U.S. government).”<sup>1</sup>

With the final run of the D&RG Railroad to Ridgway from Montrose in 1976, the focus of Montrose as an ancillary of the mining towns began to fade.

The Three-Mile Island reactor core meltdown in 1979, along with the public’s perception of safety, caused uranium prices to drop 75 percent, thus preventing any new reactors from being built in the United States. A uranium mill closed by the mid-1980s; therefore, the company town and mill site of Uravan was dismantled and is now undergoing uranium.

The other West End towns of Paradox and Bedrock were also disappearing. The only two incorporated areas on the West End that remain are Nuclear and Naturita.

### **Land Use Development Trends**

From mid-1990 to 2006, Montrose County has been in a strong growth trend. This has led to increased development as evidenced by the number of building permits issued by the Montrose County Land Use Department for residential projects.

Building permits for single family homes had the most increase for the years of 2004 through 2006, with 134 permits being issued in 2006. This was the most permits issued for single family homes since 1994, in which 140 permits were issued.

Throughout the past few years the development trend for single family has slowed, again evidenced by the number of building permits being issued. The County issued 106 permits for single family homes in 2007 and 33 permits thus far in 2008.

Development trends for commercial growth have increased throughout the past few years in Montrose County. From mid-1990 to 2006, 10 permits were issued for commercial projects. In 2007 and so far in 2008, 14 building permits have been issued for commercial development.

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<sup>1</sup> [http://en.wikipedia.org/wiki/Uravan, Colorado](http://en.wikipedia.org/wiki/Uravan,_Colorado)

## Essential Facilities

The Planning Team reviewed Montrose County's critical infrastructure using the 13 critical infrastructure areas defined by the Department of Homeland Security. Impact from the prioritized hazards was ranked as low, moderate or high for the identified critical infrastructure within the County. Findings from risk assessment activities were used to determine hazard impact on the critical infrastructure. Notwithstanding hazard impact on critical infrastructure; however, Montrose County weighted mitigation actions for hazards affecting life and safety.

Due to the potentially sensitive nature of the critical infrastructure inventory, and in keeping with State of Colorado practices for controlling critical infrastructure identification, Montrose County monitors access to this information on a need-to-know basis by application to the appropriate offices identified in this Plan.

## Declared Disasters

This chart shows the declared disasters for Montrose County.

Year	Type of declaration	Event
1984	Presidential Disaster	Flooding
1984	Governor Disaster	Flooding
2002	USDA Disaster	Drought
2002	Presidential Disaster	Wildfires
2006	USDA Disaster	Heat, high winds, insect pests, late freeze, ongoing drought

Table 5: Disaster declarations

## **Historical Hazards within Montrose County**

A volunteer with the Montrose Historical Society composed the following overview of hazards which have occurred within Montrose County, beginning in 1883. Most of these hazards are not likely to reoccur within Montrose County due to several factors. These factors could include:

- ☐ Ridgway Dam being built, which mitigates potential flooding
- ☐ Decrease in train traffic
- ☐ Rare occurrences due to proximity of mountains (tornadoes)
- ☐ Modern building codes
- ☐ Improved storm water drainage
- ☐ Being in a location that is considered to be seismically stable (earthquakes)

Some of these hazards; however, could have the potential to occur within Montrose County again in the future. These include:

- ☐ Epidemics
- ☐ Airplane crashes
- ☐ Fires to homes and businesses
- ☐ Flooding
- ☐ Wildfires, which are not mentioned in this history; however, they are discussed in detail in the Wildfire section

### **Epidemics**

Two times in Montrose County history epidemics were documented. The first was in 1883 and the second in 1918.

#### **1883**

A smallpox epidemic hit Montrose County in 1883. It is unknown how many deaths were caused by this epidemic. During the event, the town of Montrose did purchase a “pest-house” and provided \$17 for medications.<sup>2</sup>

#### **1918**

In 1918 the Spanish influenza hit Montrose County and its environs. At the year’s end there were 920 reported cases and 62 deaths. During this time the City officials did attempt, somewhat successfully to quarantine the Montrose area.<sup>3</sup>

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<sup>2</sup> Brethouwer, Dr. Norman A. “Medical.” *Montrose, Colorado Centennial*; (Grand Junction, CO: Great Western Printing and Binding, 1982), 82.

<sup>3</sup> Freeman, Dona, ed. *100 Years Montrose, Colorado* (1982), 69.

## **Floods**

Floods are mentioned in the history books; however, most of them were localized and caused damages to crops, homes and bridges. Some floods were caused by the Uncompahgre River jumping its banks and others by too much rain.

### **1917**

The Uncompahgre River flooded surrounding farmland west of Montrose in 1917; most of the land was north of Colona which is on the border of Montrose and Ouray counties. The Dorsey Farm potato crops were lost and near Colona, “several ranches [were] suffering inundation.” This flood caused significant crop damage and there was some economic impact by this disaster. During this time frame it is unlikely that any of the businesses or farms were insured.<sup>4</sup>

### **1921**

The Uncompahgre River flooded again in 1921 in Montrose and its environs. During the incident standing water was reported in many homes “in and around the city.” This generalized flooding throughout Montrose County and southwestern Colorado caused the disruption of train service.<sup>5</sup>

### **1938**

Two consecutive days of heavy rain overwhelmed storm sewer capacity turning the City into a “vast lake.” This flood, which occurred in 1938, caused significant and sustained property damage to private property, roads and bridges.<sup>6</sup>

### **1963**

An arroyo spilled over at the corner of Main and Junction streets which flooded a part of the City of Montrose in February when a strong Chinook wind caused snowmelt. This occurred in 1963.<sup>7</sup>

### **1964**

Heavy rain caused flooding in 1964 causing some damage to agriculture.<sup>8</sup>

### **1967**

A thunderstorm dumped more than one inch of rain and hail on Montrose in June 1967. This caused some crop damage. Also, many City streets were flooded, especially Uncompahgre and Main streets. The water deposited about a foot of silt over a 12-acre plot of sugar beets, destroying the entire crop.<sup>9</sup>

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<sup>4</sup> Freeman, 67-68.

<sup>5</sup> Freeman, 74.

<sup>6</sup> City of Montrose, Colorado and the Colorado Water Conservation Board, Gingery Associates, Inc., *City of Montrose Flood Control and Drainage Plan* (Englewood, CO, 1981), 12.

<sup>7</sup> Gingery, 14.

<sup>8</sup> Gingery, 14.

<sup>9</sup> Gingery, 14-16.

## **1996**

Heavy rains precipitated a flash flooding event Sept. 6, 1996, in Naturita. As a result of this storm \$200,000 in damages was caused. Home foundations and roads were damaged and many basements were flooded.<sup>10</sup>

## **1999**

In 1999 heavy rains precipitated flash flooding and caused minor damages. One of these damages, estimated at \$10,000, was the washing out of a portion of the road on Ashenfelter Hill. This occurred July 31, 1999.<sup>11</sup>

## **2002**

A section of County Road Y11 was washed out Sept. 12, 2002, as heavy rains precipitated flash flooding and caused minor damage near Bedrock. Total estimated damages were \$3,000.<sup>12</sup>

## **Fires**

The fires listed here are those which destroyed private property, mostly businesses, in Montrose. The wildfires that have occurred are listed in the Wildfire section.

## **1897**

A devastating fire occurred in the primary commercial block of downtown Montrose in 1897. Six business buildings were completely destroyed by the fire.<sup>13</sup>

## **1953**

A fire, which caused \$100,000 worth of damages to a lumber yard, occurred in 1953. This event completely destroyed the Independent Lumber Company Yard.<sup>14</sup>

## **1955**

In 1955, a fire damaged the Montrose Potato Growers Co-op. Damages to the co-op exceeded \$100,000.<sup>15</sup>

## **1958**

A fire, which completely destroyed the Mill at Framer's Union Supply Company, occurred in 1958. The damages were estimated to exceed \$100,000.<sup>16</sup>

## **1966**

In 1966 the Colorado Studs plant suffered a fire in July. The building suffered a loss estimated at \$130,000.<sup>17</sup>

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<sup>10</sup> <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storm~CO~Montrose>

<sup>11</sup> <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storm~CO~Montrose>

<sup>12</sup> <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storm~CO~Montrose>

<sup>13</sup> Freeman, 25.

<sup>14</sup> Freeman, 118.

<sup>15</sup> Freeman, 120.

<sup>16</sup> Freeman, 123.

The interior of Vurl's Farm Supply was damaged in 1970 by a fire. The estimated damages were more than \$150,000.<sup>18</sup>

## **Weather Event**

### **1933**

Only one weather event was listed in the history books. It was when a small, localized tornado touched down in Montrose in 1933. This funnel cloud briefly touched down and destroyed the east end of the County Courthouse and some damage to nearby buildings.<sup>19</sup>

## **Earthquakes**

Three minor earthquakes were noted. They include one in 1944, one in 1960 and a third in 1983.

### **1944**

In 1944, "an earthquake of moderate intensity rocked Montrose and surrounding areas for almost a minute."<sup>20</sup>

### **1960**

A "small" earthquake centered south of Ouray impacted the Montrose area. In 1960, the Montrose County area saw minimal damage throughout the area, which included crumbled chimneys, buckled sidewalks and broken glass jars.<sup>21</sup>

### **1983**

A minor earthquake Aug. 14, 1983 occurred in Montrose County. This minor earthquake centered 28 miles southeast of Montrose in a sparsely populated area.<sup>22</sup>

## **Transportation accidents**

Though not natural disasters, the following transportation accidents were listed in historical documents as hazards. One incident involved a train and the other three were aircraft accidents.

### **1919**

In 1919, 30 people were injured, some seriously, in a train wreck. A westbound Rio Grande train derailed one mile east of Cerro Summit.<sup>23</sup>

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<sup>17</sup> Freeman, 134.

<sup>18</sup> Freeman, 139.

<sup>19</sup> Freeman, 92.

<sup>20</sup> Freeman, 105.

<sup>21</sup> Freeman, 125.

<sup>22</sup> <http://earthquakes.usgs.gov/regional/states/colorado/history.php>

<sup>23</sup> Freeman, 70.

**1970**

In 1970 one person was killed and three injured as a small private plane crashed during liftoff. The plane crashed into a residence at 701 North Fourth Street, and the roof of that residence was partially sheared.<sup>24</sup>

**2004**

A private jet carrying NBC Sports President Dick Ebersol crashed during takeoff Nov. 28, 2004. This accident caused three deaths and injuries to three others.<sup>25</sup>

**2005**

On an airstrip near Bedrock Jan. 30, 2005, an ultra light aircraft crashed during a practice flight. Both of the people on board perished.<sup>26</sup>

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<sup>24</sup> Freeman, 139.

<sup>25</sup> [http://www.montrosepress.com/articles/2005/11/28/local\\_news/3.prt](http://www.montrosepress.com/articles/2005/11/28/local_news/3.prt)

<sup>26</sup> [http://www.montrosepress.com/articles/2005/02/09/local\\_news/3.prt](http://www.montrosepress.com/articles/2005/02/09/local_news/3.prt)



## Hazards in Montrose County

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The State of Colorado is vulnerable to a wide variety of natural and manmade hazards, some of which can affect the residents of Montrose County. These hazards can threaten life and property. Damage caused by these hazards could disrupt essential facilities and life lines as well as have a significant impact on the communities. The section below discusses that incident and all other hazards deemed to have a potential impact on Montrose County. It outlines these high hazards facing the County residents as selected by consensus.

The prioritized hazards, listed in this Plan, have significant loss potential. Other hazards with less potential impact or with less effective mitigation actions possibilities are also listed. Other factors considered when determining these prioritized hazards, in the addition to the planning team members' round table discussion, includes:

- ☐ Interviews with first responders
- ☐ Research of historical information
- ☐ Questionnaires distributed to several sources
- ☐ Surveys posted on the Montrose County website, and an article published in the *Montrose Daily Press*

The following natural hazards exist in Montrose County. These were identified at the first Planning Team meeting:

- |   |   |
|---|---|
| <input type="checkbox"/> Wildfire                           | <input type="checkbox"/> Drought                    |
| <input type="checkbox"/> Floods                             | <input type="checkbox"/> Uranium                    |
| <input type="checkbox"/> Flash Floods                       | <input type="checkbox"/> Pandemic                   |
| <input type="checkbox"/> Spring Run Off                     | <input type="checkbox"/> Beetle Kill                |
| <input type="checkbox"/> Severe Winter Storms               | <input type="checkbox"/> Crop Damage                |
| <input type="checkbox"/> Hazardous Materials                | <input type="checkbox"/> Vectors                    |
| <input type="checkbox"/> Dam Failure                        | <input type="checkbox"/> Storms                     |
| <input type="checkbox"/> Earthquakes                        | <input type="checkbox"/> Volcanoes                  |
| <input type="checkbox"/> High Winds                         | <input type="checkbox"/> Terrorism                  |
| <input type="checkbox"/> Microbursts                        | <input type="checkbox"/> Communications failure     |
| <input type="checkbox"/> Landslides                         | <input type="checkbox"/> Power failure              |
| <input type="checkbox"/> Tornadoes                          | <input type="checkbox"/> Lightning                  |
| <input type="checkbox"/> Erosion                            | <input type="checkbox"/> Hail                       |
| <input type="checkbox"/> Smog                               | <input type="checkbox"/> Avalanche                  |
| <input type="checkbox"/> Smoke, due to agricultural burning | <input type="checkbox"/> Subsidence                 |
| <input type="checkbox"/> Debris Flow                        | <input type="checkbox"/> Ground water contamination |
|   | <input type="checkbox"/> Expansive soil             |

Definitions of some hazards are listed here; for those not listed, they are discussed in greater detail throughout the Pre-Disaster Hazard Mitigation Plan.

The geological hazards listed: earthquakes, landslides, avalanches and subsidence as well as others are discussed in the Geological Hazards section of this plan as well as in the Mapping Project by Colorado Geological Survey. This report can be viewed on the Montrose County website.

Other potential hazards listed, but not included in detail in this Pre-Disaster Hazard Mitigation Plan are tornado and pandemic.

A tornado is a column of extremely destructive swirling winds. The funnel-shaped rotating column of air passes in a narrow path over land.

A pandemic is a disease that is found in a large part of a population. It also has a widespread effect and affects people in many different countries simultaneously. The epidemic hazard for humans may be considered somewhat greater than that of other communities because of the numbers of visitors who travel through Montrose County to get to Telluride, Ouray and Mountain Village. Many of these visitors travel frequently and arrive from all parts of the world. The County, some municipalities and a few businesses have implemented continuity of operations plans to enable rapid response to outbreaks.

The planning team then grouped the hazards by categories: weather, geological, manmade or unlikely to occur in Montrose County. Some of these were left as stand-alone hazards. Each was given a prioritization.

<b>Category</b>	<b>Hazard</b>	<b>Prioritization</b>
<i>Weather</i>		High
	Severe Winter Storms	
	High Winds	
	Microbursts	
	Drought	
	Lightning	
	Hail	
<i>Geological</i>		Medium
	Earthquake	
	Landslides	
	Subsidence	
	Expansive soils	
<i>Manmade Hazards</i>		Not Applicable
	Communications failures	
	Power failures	
	Terrorism	
<i>Unlikely to occur in Montrose County</i>		Not Applicable
	Tornadoes	

	Volcanoes	
	Avalanches	
<i>Stand-alone hazards</i>		
Wildfire		High
Floods		High
	Dam failures	
	Flash floods	
	Spring run-off	
Hazardous Materials ~ uranium		High
Pandemic		Low
Crop damage	Beetle kill, vectors or pests	Medium
Smoke due to agricultural fires		Low
Smog		Low

Table 6: Hazards categorized

The Planning Team determined; however, that the four top prioritized hazards posed a greater overall risk to life, safety, critical infrastructure and vital services. These prioritized hazards are:

- ☐ Severe Weather Events
- ☐ Wildfire
- ☐ Floods
- ☐ Hazardous Materials; Uranium
- ☐ Geological Hazards

<b>Prioritized Hazard</b>	<b>Geographical Location</b>	<b>Severity</b>	<b>Probability</b>
Severe Weather Events	Entire County	Moderate to High	High
Wildfire	Priority Areas; Wildland Urban Interface; Unincorporated areas of Montrose County	High	High
Flood	Flood Plains	High	Moderate
Geological Hazards	East End	Moderate	High
Hazardous Materials ~ Uranium	West End	Moderate	Moderate

Table 7: Rating

Those hazards of secondary concern to the Planning Team were the following hazards:

- ☐ Pandemic
- ☐ Crop damage due to beetle kill, vectors or pests
- ☐ Smoke due to agricultural fires
- ☐ Smog

Due to the lack of history of these hazards listed above, the Planning Team did not feel it necessary to focus on them. In the future, the secondary hazards as well as other hazards could possibly be included in the hazard mitigation actions.

Overall, the Planning Team for the Pre-Disaster Hazard Mitigation Plan determined that more public education for the entire population and interface with the special needs were issues that could be improved with specific mitigation goals.

## Severe Weather Events

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The scope of severe weather events that could affect Montrose County includes, but is not limited to, the following:

- ☐ Severe Winter Storms
- ☐ High Winds
- ☐ Microbursts
- ☐ Drought
- ☐ Lightning
- ☐ Hail

While these weather events happen annually, they rarely have the potential to be classified as emergencies. The National Weather Service will make announcements for severe weather watches or warnings over radio and television stations. A watch is when weather conditions indicate the possibility of severe weather. A warning is when weather patterns show that severe weather is approaching. Residents should be aware of the types of adverse weather conditions Montrose County has seen in the past and plan accordingly. One of the mitigation actions that could help Montrose County residents be aware of the weather conditions is by becoming a Storm Ready County. This National Weather Service designation has an educational component, as well as a system to notify the public of adverse weather.

Overall, the average weather for Montrose County includes the following:

Number days of sunshine	274
High winter temperature	44
Low winter temperature	20
High summer temperature	83
Low summer temperature	52
Humidity	Minimal
Annual precipitation	9.8"

Table 8: Average weather

The following chart is a summary of weather events produced from a search of the National Climatic Data Center from 1950 to Feb. 28, 2008.

Date	Location (Town)	Type	Magnitude	Result
8/14/1968	Montrose	Hail	1.75 inches	
9/19/1972	Montrose	Thunderstorm Wind	50 knots	
6/4/1973	Montrose	Hail	.75 inches	

7/12/1973	Montrose	Hail	.75 inches	
8/8/1983	Montrose	Hail	1.75 inches	
8/8/1983	Montrose	Thunderstorm Wind	62 knots	
6/16/1985	Montrose	Thunderstorm Wind	50 knots	
5/10/1989	Montrose	Thunderstorm Wind	68 knots	
5/19/1992	Montrose	Thunderstorm Wind	50 knots	
6/25/1992	Montrose	Thunderstorm Wind	50 knots	
5/26/1993	Montrose	Lightning		\$300K of property damage from fire
5/17/1994	Montrose	Winds		\$1K
5/31/1994	Montrose	Thunderstorm Wind		\$5K
7/14/1994	Montrose	Thunderstorm Wind		\$5K
9/9/1994	Olathe	Lightning		1 death
6/20/1996	Olathe	Thunderstorm Wind	0 knots	
6/20/1996	Nucla	Lightning		
9/6/1996	Naturita	Flash Flood		\$200K of property damage
5/6/1997	Naturita	Thunderstorm Wind	70 knots	\$10K of Property Damage
9/11/1997	Montrose	Funnel Cloud		
4/17/1998	Montrose	Funnel Cloud		
7/26/1998	Paradox	Heavy Rain		
6/21/1999	Olathe	Lightning		One injury
7/31/1999	Montrose	Flash Flood		\$10K of property damage
6/15/2000	Nucla	Thunderstorm Wind	65 knots	\$2K of property damage
8/30/2000	Montrose	Hail	1.75 inches	
7/9/2001	Redvale	Hail	.88 inches	
7/15/2001	Nucla	Thunderstorm Wind	50 knots	
8/14/2001	Paradox	Funnel Cloud		
8/22/2001	Uravan	Urban, small		

		stream flood		
7/28/2002	Paradox	Funnel Cloud		
8/5/2002	Nucla	Urban, small stream flood		\$10K of property damage
9/7/2002	Olathe	Thunderstorm Wind	55 knots	\$2K of property damage
9/10/2002	Naturita	Urban, small stream flood		
9/12/2002	Uravan	Hail	1 inch	
9/12/2002	Bedrock	Flash Flood		\$3K of property damage
9/18/2002	Naturita	Funnel Cloud		
8/16/2003	Paradox	Heavy Rain		
9/5/2003	Montrose	Heavy Rain		
5/12/204	Montrose	Lightning		1 death
5/13/2004	Maher	Tornado	F1	\$2K of property damage
6/16/2004	Montrose	Thunderstorm Wind	52 knots	\$10K of property damage
7/23/2004	Montrose	Thunderstorm Wind	56 knots	
7/23/2004	Montrose	Funnel Cloud		
10/25/2004	Montrose	Funnel Cloud		
5/6/2005	Olathe	Tornado	F1	20K
5/6/2005	Olathe	Hail	.88 inches	
5/6/2005	Olathe	Funnel Cloud		
5/30/2005	Montrose	Thunderstorm Wind	62 knots	
8/16/2005	Montrose	Hail	1 inch	
9/8/2005	Paradox	Heavy Rain		
10/4/2005	Bedrock	Tornado	F1	\$1K of property damage
5/22/2006	Naturita	Thunderstorm Wind	50 knots	
7/9/2006	Montrose	Flash Flood		\$20K of property damage
7/10/2006	Bedrock	Flash Flood		
7/10/2006	Montrose	Heavy Rain		
7/10/2006	Nucla	Flash Flood		
7/19/2006	Montrose	Heavy Rain		
9/7/2006	Uravan	Lightning		1 death
9/7/2006	Uravan	Flash Flood		
7/27/2007	Montrose	Flash Flood		
7/27/2007	Paradox	Heavy Rain		

8/27/2007	Redvale	Heavy Rain		
9/16/2007	Paradox	Heavy Rain		
Table 9: Weather Events				

At any one time, the entire County could be affected by any of these weather events. There also could be parts of the County that see no impacts from the same weather event. All areas are prone to such conditions, but not all could be affected at the same time. It is hard to measure the potential impacts to any specific portion since there are so many variables.

The severity differs in size, strength, frequency, intensity, duration, and impact to the residents of Montrose County. For each hazard, the following will be discussed:

- ☐ Profile ~ how the hazard impacts Montrose County
- ☐ Historical Information ~ if relevant

Most of the information in this Severe Weather section, unless otherwise noted, has been provided by the National Weather Service.

Overall, severe weather can impact Montrose County in a variety of ways. These were all discussed at the second meeting of the Hazard Mitigation Planning Team.

Communication challenges transcend both the economic and social impacts. Additional impacts are listed on the chart above, and other impacts could include:

- ☐ Economic impacts
  - Businesses closed for any amount of time
  - Loss of agricultural and livestock
  - Costs of repairs to infrastructure
  - Infrastructure damage
- ☐ Social impacts
  - Loss of life
  - Increased violence
  - Increased hospitalizations

One of the most significant historical impacts by a weather event is the corner of the Courthouse was destroyed by a tornado in 1933. This could have been a historical impact to the County. The Courthouse, which is still standing, has been placed on the National Historic Registry.

Historically, there have been floods, both in the spring and flash flood events, where roads, bridges and utilities have been lost.



## **Severe Winter Storms**

Ice and snow events can occur in Montrose County. Temperatures can exceed freezing for several days and snow accumulates over time. The problems associated with ice and snow when conditions last for several days are the most pressing. An ice and snow event, according to National Weather, is described as an occasion when damaging accumulations of ice and snow are expected. Significant amounts of ice can pull down trees and utility lines resulting in loss of power and communications as well as make walking and driving dangerous. Significant ice events are accumulations of ¼ inch or more.

Blizzards, described by National Weather, occur when winds of 35 miles per hour or greater and snow falls or blows for more than three hours or longer, are the most common snow and ice event that happens in Montrose County. These severe winter storms combine blowing snow and wind to create low visibility. Often blizzards are created from snow already on the ground, but more snow can create a problem.

Without significant winds, heavy snow below the 7,000 foot level has occurred 23 times between 1950 and February 2008. Above the 7,000 foot level, heavy snow has fallen 26 times. Heavy snow with significant winds at an elevation below 7,000 feet has occurred 14 times. Above the 7,000 foot level, heavy snow has occurred 41 times.

In the past eight years, the National Weather Service (NWS) has no record of ice storms; the NWS does not keep track of icy road events, only freezing rain events. The Planning Team states that these icy road events occur several times throughout each winter.

The Planning Team made note of the increasing numbers of people living at higher elevations within Montrose County. These higher elevations mean more snow, which the Montrose County Road and Bridge Department is currently able to manage. Any storm of record; however, will require more specialized equipment.

## **High Winds**

A high wind event is a severe weather condition that produces high winds that can occur anytime throughout the year. The National Weather Service describes high winds as winds that are sustained for speeds of 40 miles per hour or greater lasting for 1 hour or longer, or winds of 58 miles per hour or greater for any duration. These high winds can knock down trees and utilities. These storms are usually short-lived events that gust in excess of 50 miles per hour. The debris the wind picks up can knock out power lines, damage structures and injure people.

Strong wind storms that are not associated with thunderstorms have occurred below 7,000 feet in elevation equals 11, and those above 7,000 feet equal four between 1950 and February 2008. These winds are widespread pressure gradient winds associated with such things as cold fronts.

Below 7,000 feet, the criteria for a strong wind storm is sustained 40 miles per hour and/or gusts of 58 miles per hour or greater. Above 7,000 feet, the criteria for a strong wind storm is sustained 58 miles per hour winds and/or gusts of 75 miles per hour or greater between 1950 and February 2008.

## **Microbursts**

According to the National Weather Service, a microburst is a convective downdraft with an affected outflow area of less than 2.5 miles wide and peak winds lasting less than 5 minutes. Microbursts may include dangerous horizontal/vertical wind shears, which can adversely affect aircraft performance and cause property damage. These microbursts are difficult to detect and predict with standard weather instruments. These can be hazardous to airplanes during takeoffs and landings. Microbursts can also cause damage to houses, landscaping and roads.

In Montrose County, between 1950 and February 2008 there have been six microbursts or thunderstorm winds within Montrose County. These are wind gusts of 58 miles per hour or greater.

## **Drought**

A drought is caused by less-than-normal amounts of moisture to satisfy an area's usual water-consuming activities. National Weather states drought is a deficiency of moisture that results in adverse impacts on people, animals or vegetation over a sizeable area. This drought condition can be caused naturally or by human influence. With Colorado's irregular climate, it is often difficult to predict when there will be a water shortage.

At least four types of drought are defined. Meteorological is when actual precipitation is less than expected. Hydrological is based on precipitation shortfall effects on stream flows as well as reservoir, lake and groundwater levels. An agricultural drought is when soil moisture deficiencies are relative to water demands of plant life. A socioeconomic drought occurs when the demand for water is greater than the supply due to a weather-related supply shortfall.

Montrose County has experienced droughts in the past. According to the local United States Department of Agriculture (USDA) office the most recent occurred in 2002 and 2006. In 2002, across the State, snowpack was 53 percent of average. In both years, the USDA officially declared drought disasters. The USDA disaster declaration is requested by the governor. A minimum of 30 percent of production loss of at least one crop in the County must have occurred. When the USDA declares a drought, small businesses can meet criteria to apply for low-interest Economic Injury Disaster Loans. The driest year in Montrose County history is 1959 from October to September, which is the water year. The total precipitation during that time frame, October 1958 through September 1959 was 4.42 inches.

Annual precipitation in Montrose County is 9.8 inches. According to the Colorado Drought Mitigation and Response Plan a study completed by the Department of

Atmospheric Science at Colorado State University shows “that 93 percent of the time at least 5 percent of the State is experiencing drought at the 3, 6, 12 or 24 month time scale.”

According to the Colorado Climate Center, “precipitation west of the Continental Divide is more evenly distributed throughout the year than in the eastern plains. For most of western Colorado, the greatest monthly precipitation occurs in the winter months, while June is the driest month.”

The results of long droughts are losses of fish and wildlife habitat, reduction in food and drinking water for wild animals, more diseases in wildlife, lower water levels in lakes and rivers, loss of wetlands, more wildfires, and erosion of soils. Another result is a reduced production of agriculture. As a result of some of these losses, there are impacts to tourism, municipal water usage, commerce, recreation, wildlife preservation, electric power generation and water quality deterioration.

The Planning Team was concerned about the future growth impacting the available water storage, for the City of Montrose residents specifically. The City of Montrose’s Comprehensive Plan addresses this issue in relation to how much potable water consumption will be necessary for a population of 30,000, which is 7.59 millions of gallons per day based on 253 gallons consumed per day per person.

The Comprehensive Plan states, the “City is fortunate enough that past councils and staffs have acquired adequate water use and storage rights to carry the City well into the next century.”

## **Lightning**

Lightning is a natural occurrence whenever there is a thunderstorm in the area. It is a visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between the cloud and the ground or between the ground and a cloud. People can be injured or property damaged by a lightning bolt, even if the storm is several miles away from the site of the strike.

When lightning approaches people are advised to seek shelter immediately. If getting to shelter is impossible, crouch low to the ground and make yourself as small as possible and away from trees and tall objects. Water conducts electricity, so stay away from puddles and swimming pools. If you are inside, avoid electrical appliances, windows and bathtubs full of water.

Since 1968 there have been three human fatalities and one dog fatality which have been caused by lightning. In the same time frame, there have been two human injuries.

## **Hail**

Hail is frozen rain and is most common in Colorado March through October. While most of the storms are in the Front Range and along the Eastern Plains, Montrose County has

gotten some severe hail storms. Property damage, crop loss and injury can and have resulted from hail storms.

The following is a chart which describes the diameter of the hailstones:

Description	Diameter (inches)
Pea	0.25
Marble or Mothball	0.50
Penny or Dime	0.75
Nickel	0.88
Quarter	1.00
Half Dollar	1.25
Ping Pong Ball	1.50
Golf Ball	1.75
Hen's Egg	2.00
Tennis Ball	2.50
Baseball	2.75
Tea Cup	3.00
Grapefruit	4.00
Softball	4.50
Table 10: Hail sizes	

In Montrose County, between 1950 and 2008 there have been eight storms when the size of the hail has been  $\frac{3}{4}$  inch in diameter or greater. This is about the diameter of a penny and larger.

## Wildfire

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Wildfire in Montrose County has occurred almost every summer. A wildfire is any free burning uncontained wildland fire not prescribed for the area which consumes the natural fuels and spreads in response to its environment.

More than half the wildfires in Montrose County are naturally ignited, and result in more than three-quarters of the acres burnt. As new developments are planned and built in the wildland urban interface this ratio could change.

A wildfire can be characterized by three classes:

- ☐ Surface fire: burns along the floor of a forest, moving slowly and killing or damaging trees. This is the most common class.
- ☐ Ground fire: starts by lightning or human and burns on or below the forest floor.
- ☐ Crown fire: spreads rapidly by wind and moves quickly by jumping along the tops of trees.

One contributing factor to the wildfires is the mountain pine beetle, as they cause mortality in the old, slow-growing ponderosa, lodge pole and limber pines in the State. According to the experts, it is the insect that causes the most significant damage to Colorado's low and mid-elevation pine forests. The beetle attacks and kills the trees that are old, crowded or have been affected by fire, drought or root disease. The beetle kill spreads to healthy trees, after the older ones are destroyed.

Historical information about fires is included in the County Wildfire Plan. Some highlights include:

- ☐ Approximately one-half the wildfires that burn are naturally ignited
- ☐ The amount of burned area varies from year-to-year.

The trend since 1975 is summarized with the following list of historic fires of a size more than 5 acres. Mostly those involving federal jurisdiction and only those acres within Montrose County are represented:

Year	Fire Name	Cause	Size in acres
1978	Copper King	Lightning	56
1979	Uncontrolled	Human	155
1982	Clay Creek	Lightning	32
1982	Bedrock	Human	180
1985	Kinikin	Human	60
1986	Third Park	Lightning	169
1987	Red Rocks	Lightning	86
1987	Shavano	Lightning	5

1987	Little J	Lightning	10
1988	Mailbox	Lightning	80
1988	Pit	Lightning	8
1988	Devinney	Lightning	20
1988	Paradox	Lightning	8
1988	Third Park	Lightning	40
1989	Monogram	Lightning	10
1989	Traver	Lightning	22
1990	Horsefly Creek	Lightning	3,676
1990	Old Blue	Lightning	11
1990	Maggie	Lightning	142
1993	Spring Creek	Lightning	31
1994	Atkinson	Lightning	30
1994	Craig Point	Lightning	12
1994	Garvey	Lightning	100
1994	Hallelujah	Lightning	70
1994	Halley	Lightning	41
1994	Horsefly 2	Lightning	170
1994	Son of a Gun	Lightning	50
1994	Wray	Lightning	1,631
1995	Chukar	Lightning	14
1995	Rawhide	Human	7
1996	Crawford	Human	21
1996	Red Rocks	Lightning	5
1996	San Miguel	Human	10
1996	Telephone	Lightning	1,314
1996	Warner	Lightning	847
1998	Red Ranch	Human	15
1999	Braimer	Lightning	1,664
1999	Cotter	Lightning	10
1999	Dump	Lightning	10
1999	Third Park	Lightning	8
2001	Carpenter	Lightning	231
2001	Long Park	Lightning	12
2002	Bucktail	Lightning	2,244
2002	Forty Seven	Lightning	1,409
2002	Dry Park	Lightning	12
2002	Vancorum	Human	16
2002	Ouray Spring	Lightning	49
2003	Burro	Lightning	22
2003	Crystal Creek	Human	298
2003	Horsefly Creek	Lightning	10
2003	Little Bucktail	Lightning	113

2003	Poison	Lightning	12
2003	Spring Gulch	Human	242
2004	Lillyland	Lightning	4
2004	Campbell	Lightning	4,187
2005	Naturita Ridge	Lightning	729
2005	Piñon	Lightning	15
2005	Dry Fork	Lightning	30
2005	Pitts	Lightning	21
2005	Naturita Ridge	Lightning	729
2005	Craig Draw	Lightning	550
2006	Dry Creek	Human	230
2006	Bedrock #2	Lightning	8
2006	Dead Horse	Lightning	11
2006	Green Mountain	Lightning	5
2007	Section 28	Lightning	118
2007	Hauser	Lightning	41
2007	Pinion	Lightning	6
2007	Red Canyon	Lightning	207
2008	Beehive	Lightning	13
Table 11: Fires			

The impacts of a wildfire transcend the economic, social and historical categories. These include:

- ☐ Displaced people
- ☐ Roads closed or damaged
- ☐ Agriculture and livestock lost
- ☐ Infrastructure damaged
- ☐ Property damaged
- ☐ Tourism decreases
- ☐ Potential damage to historical sites

In the past, the fires have come close to destroying these local historical landmarks:

- ☐ A school house on Sanborn Park
- ☐ Cabins of settlers to the area
- ☐ Rock Art by the Ute Indians

The values at risk in Montrose County were identified in the County Wildfire Plan, and the meetings that took place for that project. This County Wildfire Plan was used as a reference document for the Pre-Disaster Hazard Mitigation Plan and can be found on the Montrose County website.

During these planning sessions, communities at risk were identified based on a weighted formula of risk and value. Other factors the GIS Department used to prioritize these communities included structure density, proximity to a fire protection district, types of infrastructure, and proximity to past larger fires. The higher numbers indicate higher fire risk. For example, the “7” priorities have the greatest risk; therefore, will be mapped by the GIS Department first. A map of these locations is included in Attachment #4. For this Pre-Disaster Hazard Mitigation Plan, the GIS Department and the Assessor’s Office worked to determine the values of the commercial and real properties at risk. Then, the Land Use Department determined if any new subdivisions were proposed for each area.

### Values at Risk for Wildfire

Within the priority areas listed in the County Wildfire Plan, the following values are at risk. Each of these Priority Areas will eventually be mapped by the GIS Department. Because of the risk assigned to each of these areas, would benefit from a Community Wildfire Protection Plan as well as specific geographical locates to be kept on file with the Montrose County GIS Department. Some of these areas would have benefitted from regulations pertaining to roads, the wildland urban interface area and defensible space.

These are only the priorities through rating “3.”

Priority Area	Priority Rating	Value in dollars of Commercial Property at risk	Value in dollars of Real Property at risk
Pea Green Corner	3	116,450	14,277,030
Hoovers Corner	3	0	19,125,560
Shavano Valley	3	0	3,420,580
Buckhorn Heights	3	0	7,133,800
Coventry	3	470,010	8,724,430
Olathe	4	15,711,020	249,044,200
Maher	4	0	7,513,420
Gould Reservoir	4	0	1,459,440
Eagle Ridge	4	0	3,626,880
Paradox	4	0	6,627,540
Bedrock	4	145,630	2,505,020
Government Spring	4	550,550	10,436,300
Vernal	4	5,088,860	21,461,000
Horsefly Creek	4	150,790	5,641,760
Deer View	4	0	5,108,700
Nucla	4	3,787,250	38,028,160
Horsefly Subdivision	4	0	3,231,760
Coke Ovens	4	0	80,410
Deer Mesa	4	0	9,896,930
Fruitland Mesa	5	16,880	10,593,480
Cathedral Peaks	5	0	3,448,380



Montrose	5	460,267,255	1,683,942,960
25 Mesa	5	0	188,400
Transfer	5	0	839,500
Shinn Park	5	0	2,678,980
Uncompahgre	5	4,570,470	53,002,190
Sims Mesa	5	0	20,242,590
Happy Canyon	5	0	3,183,480
Uravan	5	16,520	0
Blue Mountain	5	0	722,830
Buckhorn/ Elk Spring	5	0	878,320
Second Park	5	0	4,084,370
Piñon	5	0	0
Mailbox Park	5	0	754,560
Redvale	5	280,380	12,771,440
Sanborn Park	5	0	3,204,160
Paxton Lake	5	0	286,670
Cornerstone	5	0	0
Poison Springs	6	0	3,707,890
Lower Bostwick Park	6	0	9,982,480
Crystal Valley	6	0	1,422,320
Mesa Creek	6	0	634,380
Cimarron	6	1,401,660	2,489,690
Cerro Summit	6	0	107,260
Baldy	6	0	371,990
Beaver Hills	6	263,090	9,172,010
The Meadows	6	0	1,650,580
Lower Dave Wood	6	400,210	14,872,190
Mountain View	6	0	7,560
Naturita	6	4,866,940	19,017,970
Upper Dave Wood	6	0	39,922,900
Vancorum	6	22,040	1,123,180
Upper Bostwick Park	7	0	12,456,150
Kinikin Heights	7	0	5,077,910
Waterdog	7	8,820	1,174,810
Third Park	7	0	3,600
Ute	7	0	724,300
Broad Canyon	7	0	226,310
LaSal Creek	7	0	476,620
<b>TOTAL</b>		<b>\$498,134,825</b>	<b>\$2,342,787,330</b>

Table 12: Values at Risk from Wildfire

These values do not include state-assessed or exempt properties. The goal, of both this Pre-Disaster Hazard Mitigation Plan and the County Wildfire Plan is to reduce the risk to

these properties by collecting geographical information about each property located within these areas. The next step is to map these communities in greater detail for Community Wildfire Protection Plan development. According to the County Fire Plan, these community plans will identify mitigation needs on all ownerships and become attachments to the County Fire Plan. The County Fire Plan outlines steps for communities to develop Community Wildfire Protection Plans.

The following areas have proposed subdivisions in the Land Use Department:

<b>Priority Area</b>	<b># of proposed lots</b>	<b>% of value increase/ decrease</b>
Shavano Valley	3	0%
Uncompahgre	12	0%
Sims Mesa	2	0%
Vernal	9	0%
Paxton Lake	300	0%
Cornerstone	300	0%

Table 13: Growth projections ~ Wildfire Areas

This information on percentage of values that will increase or decrease was provided by the Montrose County Assessor, based on projections. Some factors in those projections include current building trends, economic factors and sales of existing properties.

The Montrose County Fire Plan addresses mitigation for both new and existing structures within these areas. This plan, adopted by the Board of Montrose County Commissioners in October 2005, gives specific information and incentives to making a structure fire wise. The plan also gives instruction on hazardous fuels treatment methods.

The Montrose County Subdivision Regulations last amended in August 2008 make multiple provisions intended to reduce the risk of wildfire in the unincorporated areas of the County. When a subdivision is proposed that may be located within the County, the following conditions must be met:

- ☐ Subdivision in which residential activity is to take place shall be designed so as to minimize significant hazards to public health and safety and to property.
- ☐ Subdivision in wildfire hazard areas must have adequate roads for service by fire trucks, fire fighting personnel and other safety equipment and have firebreaks and other means of reducing conditions conducive to fire, as determined by the applicable fire protection district.<sup>27</sup>

The Montrose County Subdivision Regulations also state that any new development in a wildfire hazard area, a standard plat note stating such shall be shown on the plat.

<sup>27</sup> Montrose County Subdivision Regulations, 3.6B

Another wildfire mitigation technique is the Annual Operating Plan meeting. All interagency fire suppression organizations meet in February to discuss some of the following:

- ☐ Cooperative agreements
- ☐ Memorandums of understanding
- ☐ Wildfire Emergency Response Fund
- ☐ Resource availability
- ☐ Predicted fire conditions
- ☐ Communications
- ☐ Additional items

## **Floods**

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Floods can occur in Montrose County either by flash flooding or a dam breach. The impacts of either of these floods can cause economic, social and historical damages. These can include:

- ☐ Increased pests
- ☐ Septic issues
- ☐ Food issues
- ☐ Breathing issues
- ☐ Toxins in water
- ☐ Electric grid

## **Dam Breach**

A dam breach is, by definition, when the barrier controlling the flow of water has been ruptured by an opening in the structure or too much water in the reservoir.

There are nine Class I dams within Montrose County. In addition, there are eight Class I dams in neighboring counties. If a breach were to occur in one of these eight Class I dams, Montrose County residents would potentially see impacts of the breach as well. Breaches could occur from a variety of problems to include but not limited to outlet failure, overflow, seepage, settlement, slides, or erosion.

A Class I dam is defined when failure would result in probably loss of human life. A Class II dam is one that if it fails, significant damage is expected; however, it will not be the loss of human life. The phrase “significant damage” refers to structural damage where humans live, work or recreate or to public or private facilities. “Damage” refers to rendering these structures uninhabitable or inoperable.

None of the 16 Class I dams are known to have failed since the dams were built.

The areas affected by a dam breach would include everything downstream of the dams.

The Class I dams in Montrose County are:

- ☐ Buckeye #1
- ☐ Cerro
- ☐ Crystal
- ☐ Fairview
- ☐ Morrow Point
- ☐ Onion Valley
- ☐ Roatcap Wash Watershed
- ☐ Shavano Valley #1
- ☐ Shavano Valley #2

And the ones located in other counties that could affect Montrose County residents are:

- ☐ Blue Mesa
- ☐ Silver Jack
- ☐ Gurley
- ☐ Lone Cone
- ☐ Miramonte
- ☐ Priest
- ☐ Trout Lake
- ☐ Ridgway

Colorado State Statute dictates that Emergency Action Plans be written by each dam owner and submitted to the State Engineer and County Office of Emergency Management. While these plans and the required inundation maps are on file, most of these are several years old. The inundation maps in particular are out dated because of stream bed flow changes as well as new developments are built. These maps are also not compatible with new technology; therefore, the goal of the Planning Team for the Montrose County Pre-Disaster Hazard Mitigation Plan is to hire a contractor to ensure all the Emergency Action Plans and required inundation maps get updated.

Because of the older maps, the only mitigation technique listed in the current Subdivision Regulations for Montrose County is specific to Ridgway Dam, which is in Ouray County. It states any property proposed for subdivision “that is located within the inundation area of Ridgway dam shall include the ‘Standard Plat Note for Ridgway Dam’ on the Final Plat. Other properties similarly affected by other dams where inundation information is available or can be generated from known record sources shall include an equivalent plat note on the Final Plat.”

### Values at Risk

It is difficult to determine the potential losses from these outdated flood inundation maps; however, the GIS Coordinator estimated these losses. The following is an estimate of the values at risk:

<b>Dam</b>	<b>Value in dollars of Ag Property at risk</b>	<b>Value in dollars of Real Property at risk</b>	<b>Value in dollars of Commercial Property at risk</b>	<b>Estimated number of people potentially at risk</b>
Buckeye	1,276,390	164,870	0	35
Cerro	2,213,810	6,376,870	410,440	120
Crystal	0	0	0	0
Fairview	1,891,320	15,233,310	15,510,300	320
Morrow Point	0	0	0	0

Onion Valley	970,860	0	0	10
Roatcap	1,583,970	871,120	0	30
Shavano Valley 1 & 2	554,070	763,400	0	30
<b>TOTAL</b>	<b>\$8,490,420</b>	<b>\$23,409,570</b>	<b>\$15,920,740</b>	<b>545*</b>

Table 14: Values at Risk from dam breach

\* This is estimated by the number of houses in each of these areas multiplied by an average of 2.5 people per house then rounded up to the nearest factor of 5.

The GIS Coordinator determined these values by placing a buffer along the affected waterway until it connected to the next major waterway downstream. All properties in that area were included in the values at risk.

Exempt properties as well as those assessed by the State are not included in these calculations; therefore, the value of the infrastructure is not taken into consideration. The values for Crystal and Morrow Point are zero because they are in the Black Canyon of the National Park. This location would potentially not affect any Montrose County properties. It is possible; however, that if the dam at Morrow Point was to breach, some water could flow into Cimarron Creek into the town of Cimarron.

As these flood inundation maps are updated, the Montrose County Office of Emergency Management and the GIS Coordinator will re-evaluate for potential losses and potential mitigation strategies to protect lives, property and the environment.

The only proposed subdivision in the Land Use Department for any of these areas is below the Shavano Valley dams. There are three new homes proposed, yet these proposed homes will neither increase nor decrease the overall property values. This information on percentage of values was provided by the Montrose County Assessor, based on the same projections used in the Wildfire section.

## Flash Floods

Flash floods are caused by excessive rainfall, rapid snowmelt or sudden release of water from a release of a blockage of the drainage. The National Weather Service states that a flash flood is a rapid and extreme flow of high water into a normally dry area, or rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event, which could be an intense rainfall, quick snowmelt, dam failure or ice jam. The actual time threshold may vary in each of the areas due to absorption rate of soils, how large the flood plain, and other factors.

The dry, sandy soils in the area do not absorb much of the water that flows during a flood event. Another factor to floods is if the area being flooded has incurred development. An area that was used for agricultural purposes that is now a subdivision has less ground available that can absorb excess waters. The rapid moving waters of the flash floods have the potential to roll boulders, tear out trees and destroy buildings. If a flash flood warning

is issued, residents are advised to get to higher ground. After water starts to run, residents are advised to not drive, walk or swim through the running water.

The areas where flash flooding may occur are in natural drainage areas and next to rivers, streams and dry creek beds. The most common areas for this flash flooding are along the 100-year floodplains for all rivers, creeks and tributaries in Montrose County. The potential for flooding is high, especially during the spring.

The major rivers in the County include:

- ☐ Dolores
- ☐ Gunnison
- ☐ San Miguel
- ☐ Uncompahgre

The smaller water resources include:

- ☐ Cimarron River
- ☐ Cottonwood Creek
- ☐ Crystal Creek
- ☐ Dry Creek
- ☐ Dry Fork of the Escalante Creek
- ☐ Escalante Creek
- ☐ Long Creek
- ☐ Monitor Creek
- ☐ Moore Creek
- ☐ Potter Creek
- ☐ Roubideau Creek
- ☐ Spring Creek
- ☐ Tabeguache Creek
- ☐ Traver Creek

The populations most at risk from this type of flooding include those who live near the confluences of these rivers and creeks.

Hydrological Feature	Confluence	Area	Value in dollars of Real Property at risk	Value in dollars of Commercial Property at risk	Comments
Gunnison River	Crystal Creek	Maher	0	0	Confluence within BLM
Crystal Creek	Cottonwood Creek	Maher	875,190	0	

Gunnison River	Cimarron Creek	Cimarron	0	0	Confluence within BLM
Uncompahgre River	Spring Creek	Uncompahgre Valley	1,430,720	0	
Roubideau Creek	Long Creek	Uncompahgre Plateau	0	0	Confluence within Forest
Roubideau Creek	Traver Creek	Uncompahgre Plateau	0	0	Confluence within Forest
Roubideau Creek	Moore Creek	Uncompahgre Plateau	0	0	Confluence within Forest
Monitor Creek	Potter Creek	Roubideau	0	0	Confluence within BLM
Roubideau Creek	Potter Creek	Roubideau	0	0	
San Miguel River	Cottonwood Creek	Uncompahgre Plateau	385,650	0	
San Miguel River	Dry Creek	West End	866,860	22,040	
San Miguel River	Tabeguache Creek	West End	0	0	Confluence within BLM
Dry Fork of the Escalante	None	Roubideau	0	0	
Escalante	None	Roubideau	0	0	

Table 15: Values at Risk near confluences

This information above is provided by the Montrose County GIS Department. It includes the values of all structures for a mile radius of each of the confluences.

A map of these water features can be found within Attachment #4. Other types of flash flooding can include intense rain over a small geographic area, rapid snowmelt or ditches being too full.

These rivers in Montrose County are included in the Federal Insurance and Mitigation Administration's floodplain maps; however, these maps were completed in 1986. Since that time, the flow of the rivers has changed and these maps do not give a completely accurate depiction of the floodplains and the structures in those areas. The State is working on re-mapping those areas. Montrose County is 55<sup>th</sup> on the priority list, out of the 64 counties within the State. Along with the improved flood plain mapping, the County and City would like to study the hydrology of each creek.

Montrose County has seen flash flooding, as noted in the Historical Hazards section. According to the National Weather Service, there have been three potentially life-threatening flash floods in the past eight years. There have not been any river floods, such as during the spring snow melt, in the same time frame. However, the County Engineer is



working on a Road and Bridge Capital Improvement Plan which outlines some bridges that should be raised in the event that the Uncompahgre River, or others, floods.

The Cimarron Ridge area is a high-risk drainage area. In 1983 and 1984, flooding in this area caused \$300,000 worth of damage. In 1984, flash flooding occurred in Montrose, Naturita, Olathe and in unincorporated Montrose County. In 1996, there was \$200,000 worth of property damage in and around Naturita.

To help mitigate flash flooding within the County, the Subdivision Regulations state any new subdivision requires a “drainage report, authored, signed and sealed by a Professional Engineer ... All drainage reports shall be prepared in accordance with the Montrose County Stormwater and Drainage Regulations and shall be subject to the approval of the County Engineer or his/ her designee.”

The City of Montrose also has a Stormwater Pollution Prevention section in the Municipal Code. This code addresses environmental violations to potential stormwater drains. It regulates how stormwater should be managed at new construction sites.

According to FEMA, in Montrose County and in the City of Montrose, and the towns of Olathe, Naturita and Nucla, there have been no repetitive loss properties. Montrose County will continue to work to stay in compliance with the National Flood Insurance Program standards.

Montrose County is in compliance with the NFIP (National Flood Insurance Program) standards by adopting the “Montrose County Flood Damage Prevention Ordinance,” which includes Statement of Purpose, Establishment of Development Permit, and Provisions for Flood Reduction. Montrose County originally was in the program in Feb.15, 1984, was then suspended on June 19, 1989, and has been in the program since reinstatement Nov. 22, 1989.

Montrose County will continue to comply with the regulations by identifying flood plains on new subdivision proposals and final plats. Building permit requirements mandate Flood Plain permits where identified on the Flood Insurance Rate Maps (FIRM). Sanitation permits also require compliance with the ordinance.

The Flood Plain Management Regulations, which are included in the City of Montrose’s Municipal Code, addresses the development and building in the floodplains. This Code states all new construction shall be:

- ☐ “designed to prevent flotation, collapse or lateral movement ...”
- ☐ “constructed with materials ... resistant to flood damage ...”

The City’s Comprehensive Plan also addresses Stormwater Drainage Ways. This issue is mentioned as one of the greater challenges to Montrose, which could involve capital improvements to existing neighborhoods. The plan states that although, “the average

annual precipitation for the Montrose vicinity is only 9 inches, these relatively dry conditions can compound the stormwater drainage problem. Arid conditions limit the vegetation growth within the natural drainage basins, and consequently, there is little cover to absorb and infiltrate runoff when heavy rainfall does occur, which then leads to flash flooding.”

The City recognizes that improvements to the drainage system as well as cooperation with Montrose County are future mitigation actions that must be addressed.

## **Geological Hazards**

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The Geologic Hazards Mapping Project for Montrose County, as prepared by the Colorado Geological Survey, can be found in its entirety on the Montrose County website. This is a summary of what geological hazards were addressed in that plan. This summary is taken from the presentation by the Colorado Geological Survey to Montrose County. The mapping project included the eastern portion of Montrose County, and only private lands.

The project methodology included the collection, digitization, and geo-referencing of all relevant data for each hazard. The hazard map layers for each of the following were developed:

- ☐ Landslide
- ☐ Rock fall
- ☐ Debris/ mud flow
- ☐ Avalanche
- ☐ Swelling soil
- ☐ Collapsible soil
- ☐ Corrosive soil
- ☐ Flooding
- ☐ Earthquakes and faults
- ☐ Mancos shale/ salinity/ selenium

The Colorado Geologic Survey determined landslides and potentially unstable slopes are the most significant geological hazard to mitigate for future land use development within Montrose County. The next significant hazard to address is mudflows. These two hazards can be mitigated with codes and regulations within the Montrose County Land Use Department.

The other geological hazards are only constraints to future development. To mitigate these other hazards, developments will need to be appropriately engineered for the hazard. These hazards are mapped and final plats included in the study are posted on the Montrose County website. These maps are also in the Montrose County GIS data base and will be made available to all developers who apply for subdivisions.

### **Landslides**

Of these geological hazards, landslides were considered by the Colorado Geological Survey to be the most dangerous. A landslide is a subsurface shearing and downward movement of rock and soil. This phenomenon occurs in weak rock and clay soils on steeper slopes where driving forces exceed the resisting forces.

The main areas in the Montrose County study area where landslides are common include:

- ☐ Upper Cedar Creek

- ☐ Cimarron Ridge
- ☐ Bostwick Park
- ☐ Shinn Parks
- ☐ Pleistocene terraces within irrigated Uncompahgre Valley
- ☐ Morrison Formation underlying Dakota sandstone on the Uncompahgre Plateau

With the growth in Montrose County occurring on the mesas, these areas will see impacts to residences that are proposed for what was once agricultural land. The mesas will soon need specific mitigation techniques to address landslides. The Colorado Geological Survey addressed the following considerations that should be addressed in the Land Use Department:

- ☐ All slopes underlain by Mancos Shale along the mesa rims should be considered potentially unstable
- ☐ Off-property water usage can directly impact slope stability

The impacts of landslides to agricultural land are minimal to the terrace tops. This is usually a temporary loss of an irrigation ditch as well as minor acreage loss along the mesa edge. The potential for structural damage is increasing; however, as new people move to the area. These new-comers are unaware of the potential damages; therefore, Land Use codes need to address possible impacts.

## **Rock fall**

A rock fall is when weathering and gravity causes rocks to detach and fall or roll down a slope. This occurs in steep slopes and can be catastrophic in nature to houses located in a rock's path. The areas of potential rock falls in Montrose County include the Black Canyon area, the canyon rims of the Uncompahgre Plateau, within large landslide deposits; and exposed gravel at mesa rims. Building or developing in these rock fall areas, according to the Colorado Geological Survey, should be avoided or properly mitigated. Some of the mitigation techniques include rock reinforcement and protection systems; however, a mechanism for maintenance of such should be in place.

## **Avalanche**

There is only one area in Montrose County prone to avalanches, which are wet snow slides that may occur along drainage channels in steeper slope areas. The location is the high-elevation terrain on the west side of the Cimarron Ridge.

## **Mudflow or debris flow**

The mudflow, or debris flow, is a geologic phenomenon whereby a wet, viscous, fluid mass of fine- to coarse-grained material flows rapidly down slope. It is generally initiated by an intense rainfall in the steeper slopes of the drainage basin. It occurs in the drainages and spreads at the mouth of the ephemeral stream to form alluvial fans.

The hazard areas for the mud and debris flows are:

- ☐ Side canyons of the Uncompahgre Plateau on the west side of the valley
- ☐ Mud fans from the Mancos Shale adobe hills
- ☐ Large mud fans in the southern project area
- ☐ Alluvial fans in steeper terrain in the eastern project area
  - Bostwick Park
  - Upper reaches of Cedar Creek
  - Pool Gulch on Poverty Mesa
  - Cimarron River valley

The recommendation by the Colorado Geological Survey was that all new subdivisions and other developments within this mapped hazard area should include an in-depth drainage report that specifically addressed the potential for off-site bulked flows onto the property.

### **Swelling soils**

The swelling soils are soils that contain expansive clay which expand upon absorbing water and shrink as they dry. This expansion causes soils to heave. Within Montrose County Mancos Shale and Morrison Formations Mudstones contain expansive clays.

Colorado Geological Survey recommends areas mapped with moderate to high ratings of these types of soils require the developer to provide Montrose County with subsurface soil sampling as well as proper irrigation and grading plans.

### **Collapsible soils**

The collapsible soils in Montrose County are low-density, hydrocompactive and dispersive clay soils. These soils cause ground subsidence and any type of settlement damages foundations built at shallow depths.

The recommendations for future development include investigating to determine the thickness of soils and potentials for subsurface voids; testing for swell consolidation; engineering for irrigation and grading; and digging deep for foundations of larger buildings.

### **Corrosive soils**

The soils with a high concentration of salt and sulfates may be considered corrosive. The Mancos Shale, which is prevalent in Montrose County, is considered corrosive. The only mitigation technique suggested by the Colorado Geological Survey is that concrete used in building be resistant to the corrosive nature.

## **Flooding**

Colorado Geological Survey digitized then geo-referenced the available Uncompahgre Valley Flood Insurance Rate Maps. Using this information CGS prepared a flood frequency map, which can be viewed online.

## **Earthquake and faults**

An earthquake and fault map for a 70-mile radius was compiled by Colorado Geological Survey. This information was input into the HAZUS system and modeled after the 1960 5.5 magnitude earthquake. This earthquake was the largest instrumentally recorded earthquake in Colorado, with an epicenter located just inside Ouray County, which is south of Montrose County. The projected economic loss in today's dollars equal \$27.2 million.

## **Mancos Shale, salt precipitate, and selenium impairment**

The salinity and elevated selenium concentrations are a concern for the Uncompahgre River Valley. Considerations for this include irrigation drainage from areas underlain by Mancos Shale will have high salt loading; deep percolation, dissolution and irrigation drainage contributes the most to selenium loading; new development in Mancos Shale will lead to a spike in concentrations; and Mancos soils are corrosive.

## **Hazardous Materials**

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The most prevalent Hazardous Material in Montrose County is the one that occurs naturally, more on the West End than in any other location. This area has had a long history of uranium and vanadium mining. While there have been no documented disasters, the potential is prevalent.

Uranium, as defined by the dictionary, is a radioactive chemical element which is a heavy silvery-white radioactive metallic element occurring in three isotopes. Vanadium, also defined by the dictionary, is a poisonous silvery-white metallic element.

The Colorado Department of Public Health and Environment has information on the remediation of the old Uravan site, which is a Superfund Site. Superfund Site means that the Environmental Protection Agency determines there is a release or threatened release of hazardous substances that may endanger public health, welfare or the environment.

The site, which was placed on the list of Superfund sites on June 6, 1986, states “a complex mixture of chemicals exists at the site. Contaminates include radioactive products including raffinates, raffinate crystals, and mill tailings containing uranium and radium.”

These tailings have been relocated in covered cells. The soil surrounding the mill site, as well as the groundwater, still contain radionuclides and heavy metals; however, since “no one lives in the town of Uravan and the groundwater is not being utilized, the human health risks are considerably limited.”<sup>28</sup>

The trucks took ore from the mines of the surrounding areas to the processing plant at Uravan. Between the years of 1936 and 1984, people at the plant “milled 42 million pounds of vanadium. The mildly radioactive tailings (byproducts of the extraction) were deposited in huge piles above the canyon next to the plant.”<sup>29</sup>

Uranium mining on the West End of Montrose County has been significant to the economy. The West End is continually feeling the impact because of its cyclical nature. According to the West End Museum website in [Uravan History ~ Longer Version](#) “The history of Uravan [and the entire West End] is a series of repeated crises that have had the uranium~vanadium mining swinging up and down for almost a century.” This “swinging up and down” has affected the County financially, socially and physically.

Mining has been prevalent in Montrose County since the 1880s, and the West End was developed to support these efforts. Currently, a search of the Colorado Division of Minerals and Geology shows 73 permitted mines in the West End of Montrose County. Most of these permits are for uranium and vanadium. Several of these are kept in a ready

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<sup>28</sup> <http://www.cdphe.state.co.us/hm/rpuravan.htm> “Exposure”

<sup>29</sup> [www.uravan.com](http://www.uravan.com)

state, in order to be put into production within short notice. These areas in the West End can become operational when the price and demand warrants.

Currently, the town of Uravan is now an abandoned ghost town and Superfund site.

Uranium is a raw material comprised of oxidized uranium that is mined from ore. It contains scant radioactive elements. It is put through various milling processes that turn the element into fuel rods, which are used in nuclear power plants. This mined ore is trucked by highway to the mill, where it is processed to separate the uranium and the vanadium from other materials. The ore is put into the 55-gallon drums and trucked to a uranium enrichment company to turn it into a form that makes it easier to further enrich the uranium for nuclear reactors at power plants.<sup>30</sup>

Citizens on the West End have expressed concerns from water quality, to soil contamination and other environmental effects. At this time the County does not have any programs to look at concerned neighbors' water wells, soil or to conduct any air quality monitoring in the area. This leaves the citizens of the West End of Montrose County without any way of establishing what base line environmental quality is in existence at this time. Their concerns are that some of the things that have occurred around energy development in other counties may occur here:

- ☐ Will a producing well with acceptable water quality become affected?
- ☐ Will farm land or air quality be impaired or contaminated with activities from the milling, mining or transportation of ore in to the mill or from the product being shipped out of the area?

To a large extent the companies driving energy development in other counties in Colorado is being done by large, experienced international companies with environmental issues. The growth in the West End of Montrose County seems to be connected to new startup corporations starting to develop a reputation and small mining operators with historical established mining permits. Environmental monitoring and environmental services to the West End of Montrose County would at least leave the County better prepared to respond to developing issues before they become a public health hazard.

In a news article, "Even residents of this area who say their uranium-miner relatives died of lung cancer or have suffered emphysema, welcome new jobs that come with another spike in the element that is marbled into their land."<sup>31</sup>

The impacts are social: displaced people, contamination of wells and land; economic: road damaged, loss of produce; and historical value: the area has seen the cyclical nature of the business and all that entails. The population of the West End of Montrose County,

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<sup>30</sup> Chakrabarty, Gargi. "Interest revives in Colorado uranium," *Rocky Mountain News*, March 27, 2005.

<sup>31</sup> Lofholm, Nancy. "Prices revive Colorado's dormant uranium mines," *Denver Post*, Jan. 4, 2005.



which includes the towns of Nucla, Naturita and Paradox, is about one-third the total population of the County.

One thing currently being done to mitigate the potential impacts on the West End of Montrose County is a study funded by the Colorado Department of Local Affairs that will look at all the impacts the energy industry has on the area. One of the focuses of that study will be road codes and impacts.

## **Risk Assessment**

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This Pre-Disaster Hazard Mitigation Plan focuses on the Town of Olathe, City of Montrose, and Montrose County; however, it is not a multi-jurisdictional plan. Risks related to each jurisdiction should also be assessed for vulnerabilities and loss potential specific for those jurisdictions. Montrose County conformed to this guidance by conducting the following risk assessment activities to establish risk potential and hazard impact within the planning areas:

- ☐ Public risk assessment input
- ☐ Identification of critical infrastructure
- ☐ Risk assessment
- ☐ Risk of hazard impact by participating jurisdiction

Montrose County used the risk assessment activities discussed in this section to identify hazards that pose high risks to Montrose County. The planning team determined that these hazards justify mitigation planning and are the focus of the mitigation actions described in this Pre-Disaster Mitigation Plan:

- ☐ Severe Weather
- ☐ Wildfire
- ☐ Floods
- ☐ Hazardous Materials ~ Uranium
- ☐ Geological Hazards

It is anticipated that future versions of this Pre-Disaster Mitigation Plan will not only refine the risk assessment for these hazards, but may encompass further analysis and planning for additional hazards not prioritized in this first plan.

### **Public Risk Assessment Input**

Public comment was collected through invitation to meetings. As part of this process, the planning team also solicited input from professionals in emergency management, fire services, medical and health services, law enforcement, planning, government administration, community development, transportation, utilities and others in public and private sectors.

These invitations were issued using newspaper advertisements, public notices in selected government offices and individual invitations to the aforementioned groups.

The Montrose County planning team identified these as the prioritized hazards for mitigation planning:

Prioritized Hazard	Probability
Severe Weather	High
Wildfire	High
Floods	Medium
Geological Hazards	Medium
Hazardous Materials ~ Uranium	Low

Table 16: Prioritized hazards

Montrose County completed the risk assessments using a process most effective for the team. The team, under direction of the Emergency Management Coordinator, conducted multiple sessions where project participants reviewed all possibilities and in round table discussions determined the best one.

The risk assessment activities conducted as part of this project provided the planning team with sufficient information and justification to describe the hazard threats to the County. Montrose County ranked each hazard according to a risk scale defined below:

- ☐ Low: Hazard impact causes minor disruption to critical infrastructure and emergency services. Risks to life or safety are minor and hazard impact causes little disruption to Montrose County.
- ☐ Medium: Hazard impact causes some disruption to critical infrastructure and emergency services, but the likelihood of such disruption directly contributing to personal injury, loss of life, or extensive property damage is not significant.
- ☐ High: Hazard impact results in disruption to critical infrastructure and emergency services and contributes to personal injury, fatalities or extensive property damage.

The Planning Team also considered the potential for the occurrence and future impact from the prioritized hazards. Expert input indicates that probability exists that the prioritized hazards will continue to affect the County. Based on population growth projections and anticipated property value increases, it was determined that the future impact potential from these hazards would increase in the absence of effective mitigation actions.

### **Hazard Impact on Critical Infrastructure**

The planning team reviewed Montrose County's critical infrastructure using the 13 critical infrastructure areas defined by the Department of Homeland Security. Impact from the prioritized hazards was ranked as low, medium or high for the identified critical infrastructure. Findings from risk assessment activities were used to determine the hazard impact on these critical places. Montrose County weighted mitigation actions for hazards

affecting life safety as well as the damage that could occur to any of these critical infrastructures.

Due to the potentially sensitive nature of the critical infrastructure inventory, and in keeping with the State of Colorado's practice for controlling critical infrastructure identification, Montrose County monitors the access to this information through the Emergency Management Coordinator. This information is available on a need-to-know basis by application to the appropriate person(s) identified in this plan.

### **Hazard Vulnerability based on projected land use and demographics**

Based on land use and population growth projections, Montrose County anticipates continued rapid population growth. In the absence of effective mitigation measures, these projections indicate increasing loss potential from the prioritized hazards identified in this plan.

### **Hazard Impact on populations**

The prioritized hazards listed in this Plan could have potentially large implications to life safety of Montrose County citizens. With proper education campaigns, warning and other mitigation techniques outlined in this plan, effects could be minimized. At any one time, Montrose County in its entirety could be affected by any disaster. There could also be portions of the County that see no impacts from the same event.

## **Hazard Mitigation Strategy**

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During the planning process at the meeting June 25, 2008, all possible mitigation strategies were looked at for each hazard. The risk assessment identified and prioritized these hazards for future mitigation planning:

- ☐ Severe Weather
- ☐ Wildfire
- ☐ Floods
- ☐ Hazardous Materials ~ Uranium

Since the geological hazards were discussed at a separate meeting, these mitigation strategies are to be considered as well. These were not ranked using STAPLEE; however, future versions of this Pre-Disaster Hazard Mitigation Plan will require the Geological Hazard Mitigation Strategies be developed with that process.

These hazards were prioritized, in part, by the potential broad impact to life safety, property protection and environment. Impacts to Montrose County's residents, critical infrastructure and vital services were also used to prioritize hazards.

Montrose County has adopted the mitigation strategy guidance from FEMA that suggests a risk-analysis method that uses two general categories for pre-disaster mitigation:

- ☐ Actions to reduce the frequency and/or severity of hazard events
- ☐ Actions that reduce the vulnerability of community assets

The mitigation actions set forth in this section draw on those concepts as well as from a collection of respected resources. For example, some of the proposed mitigation actions were suggested by members of the Montrose County Planning Team and others were found during the course of research conducted for this project. Additional items were proposed by citizens of Montrose County. Each item was evaluated to determine which would best protect lives, save property and shield the environment.

### **Mitigation Goals and Objectives**

To serve as a guideline for Montrose County's Pre-Disaster Mitigation Plan and to comply with FEMA guidance from the Hazard Mitigation Grant Program Final Rule, Montrose County identified goals and objectives for mitigation actions. These goals and objectives provide metrics to gauge results of mitigation actions and to guide updates and improvements to this plan. The goals and objectives were arrived upon based on a risk-analysis method that will reduce impacts to lives, property, critical assets and services as well as the environment.

A mitigation goal is a principle that explains what is to be achieved as well as the vision for mitigation actions. Objectives are specific steps or measureable outcomes needed to

achieve those goals. The Planning Team considered and developed goals and objectives as part of the mitigation actions, and those goals and objectives are summarized with related proposed mitigation actions listed.

Goals, objectives and mitigation actions are listed in Appendix #A to this document.

### **Existing Hazard Mitigation Reports, Studies and Programs**

Montrose County has, in place or in progress, plans, studies and programs that identify, assess or mitigate the hazards discussed. These current plans are listed:

<b>Montrose County Existing Hazard Mitigation Reports, Studies and Programs</b>				
<b>Jurisdiction and Lead Agency</b>	<b>Plan</b>	<b>Mitigation Actions</b>	<b>Mitigation Category</b>	<b>Relevant Hazard(s)</b>
City of Montrose	Building Codes	Various	Protection to Life, Public Safety, Property Protection	Fire
City of Montrose	Engineering standards and specifications	Various	Protection to Life, Public Safety, Property Protection	All
City of Montrose	Flood Plain Regulations	Various	Protection to Life, Public Safety, Property Protection	Flood
City of Montrose	Master Plan	Various	All	All
City of Montrose	Storm Water Plan	Drainage Standards	Property Protection	Flood
Colorado Division of Emergency Management	Colorado Hazard Mitigation Plan, 2008	Various	All	All
Colorado Division of Water Resources	Emergency Action Plans	Some plans in place by dam owners	Property Protection	Flood
Montrose County	Comprehensive Plan	Various	All	All

Montrose County	Emergency Operations Plan	All	Protection to Life, Public Safety, Property Protection	All
Montrose County	Engineering standards and specifications	Various	Protection to Life, Public Safety, Property Protection	All
Montrose County	Flood Plain Regulations	Various	All	Flood
Montrose County	Geological Hazards Plan	Various	All	All
Montrose County	Montrose County Wildfire Plan	Community Wildfire Protection Plan (CWPP)	Property Protection	Wildfire
Montrose County	Subdivision and Zoning Regulations	Land Use and Zoning	Property Protection	All
Table 17: Plans currently in existence				

The Planning Team recognizes the benefit of incorporating, as appropriate, mitigation actions resulting from the Pre-Disaster Hazard Mitigation Plan with current and future hazard mitigation reports, studies, programs to include capital improvement plans, building code reviews, hazards site reviews and permitting. The Local Emergency Management Planning Committee will work with the participating jurisdictions to facilitate coordination to update the mitigation plan.

### **Proposed Mitigation Actions**

The following mitigation actions were evaluated by Montrose County for the prioritized hazards.

The Planning Team for the Pre-Disaster Hazard Mitigation Plan determined the overarching goal was to protect the life safety of Montrose County citizens. The Planning Team also determined that protecting infrastructure, property and the environment were also important. Each mitigation action reflects one or all of these values.

Potential mitigation actions were determined through interviews with public and private sector experts, summarized in the table below, and supported by input from the community and research by the Planning Team. The table below includes a partial but representative list of sources consulted for potential mitigation actions relevant to the prioritized hazards.

Potential Mitigation Action Sources for Various Hazards	
Prioritized Hazard	Interviews and Document Reviews Conducted for Potential Mitigation Actions
Severe Weather	<input type="checkbox"/> National Oceanic and Atmospheric Administration <input type="checkbox"/> Engineer, Montrose County <input type="checkbox"/> Engineer, City of Montrose <input type="checkbox"/> Community Development Director, City of Montrose <input type="checkbox"/> National Weather Service <input type="checkbox"/> Montrose Historical Society <input type="checkbox"/> Land Use Director, Montrose County <input type="checkbox"/> Chief of Police, Montrose <input type="checkbox"/> Deputy Chief, Montrose Fire Protection District <input type="checkbox"/> Emergency Preparedness Coordinator, Montrose County Health & Human Services <input type="checkbox"/> <i>Montrose Daily Press</i>
Wildfire	<input type="checkbox"/> Chiefs of local fire districts <input type="checkbox"/> Wildfire Mitigation Specialist, Bureau of Land Management <input type="checkbox"/> District Forester, Colorado State Forest Service <input type="checkbox"/> RACES volunteer <input type="checkbox"/> <i>Montrose Daily Press</i> <input type="checkbox"/> Montrose County Wildfire Plan <input type="checkbox"/> Coordinator, Montrose County GIS <input type="checkbox"/> National Fire Plan <input type="checkbox"/> Colorado State Statutes <input type="checkbox"/> Gunnison County Hazard Mitigation Plan
Floods	<input type="checkbox"/> Engineer, Colorado State Division of Water Resources <input type="checkbox"/> Manager, Project 7 Water <input type="checkbox"/> Manager, Uncompahgre Valley Water Users <input type="checkbox"/> Engineer, Montrose County <input type="checkbox"/> Road Supervisor, Montrose County <input type="checkbox"/> Engineer, City of Montrose <input type="checkbox"/> Volunteer, Civil Air Patrol <input type="checkbox"/> <i>Montrose Daily Press</i> <input type="checkbox"/> Senior Maintenance Supervisor, Colorado Department of Transportation <input type="checkbox"/> Local Emergency Action Plans <input type="checkbox"/> Bureau of Reclamation <input type="checkbox"/> Coordinator, Montrose County GIS
Geological Hazards	<input type="checkbox"/> Colorado Geologic Survey Report <input type="checkbox"/> Engineer, Montrose County <input type="checkbox"/> Land Use Director, Montrose County



Hazardous Materials ~ Uranium	<input type="checkbox"/> Environmental Health Specialist, Montrose County <input type="checkbox"/> Environmental Protection Agency website <input type="checkbox"/> Director, Montrose County Health & Human Services <input type="checkbox"/> <i>Montrose Daily Press</i>
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Table 18: Resources

Once collected, mitigation actions were evaluated using the Social, Technical Administrative, Political, Legal, Economic and Environmental (STAPLEE) methodology. This is a standard methodology approved by FEMA that seeks to objectively evaluate mitigation options to ensure those selected are consistent with and complementary to other community goals and objectives. The results of the STAPLEE evaluation process produced prioritized mitigation actions for implementation within the planning area. A summary of STAPLEE evaluation criteria is shown in the following table:

S-Social	Actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause unreasonable impact to lower income people, and if they are compatible with the community's social and cultural values
T-Technical	Actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
A-Administrative	Proposed actions can have the necessary staffing and funding
P-Political	Public support for the action is evident and all stakeholders have had adequate opportunity to participate in the process
L-Legal	The jurisdiction or agency implementing the action has the legal authority to do so
E-Economic	An evaluation of whether or not the proposed action is cost-effective, as determined by a cost-benefit review and able to be funded
E-Environmental	Verification that the proposed actions do not have an adverse environmental effect, comply with existing environmental laws and are consistent with the jurisdiction's environmental goal

Table 19: STAPLEE

An example of the STAPLEE analysis tool is shown in Attachment #5. The Planning Team considered the risk analysis, input from all project stakeholders and results of the STAPLEE evaluation to identify the hazard mitigation goals, objectives and specific actions to be undertaken. These are listed in Appendix #A to this Plan.

### **Cost/Benefit Analysis**

The Planning Team has conducted a high-level cost/benefit analysis on the mitigation actions listed in Appendix A of this Plan. These mitigation actions have been prioritized (high, medium, low) according to this initial analysis as reflected in that appendix. Continuing review, analysis and implementation planning will occur following the adoption of this plan.

### **Mitigation Action Implementation Strategy**

The mitigation actions identified in Appendix #A will be implemented under guidance from mitigation work groups for Montrose County. These work groups will be formed under direction of the Emergency Management Coordinator and will include public participants from the planning area as well as others representing jurisdictional agencies.

Budget availability for hazard mitigation is minimal within Montrose County. Recent changes to federal law; however, encourage a more pro-active strategy. Montrose County's Local Emergency Planning Committee will use the implementation plans to build on the work accomplished in this Plan to meet that strategy.

Montrose County's mitigation action implementation plans will be formed by the Local Emergency Planning Committee. Initial activities will assess each proposed mitigation action listed and complete an implementation plan to include some of the following information:

- ☐ Prioritized mitigation action
- ☐ Jurisdiction(s) covered in mitigation action
- ☐ Mitigation category
- ☐ Relevant hazard(s) addressed by the action
- ☐ Priority
- ☐ Estimated cost for implementation
- ☐ Potential funding sources
- ☐ Cost/Benefit analysis results
- ☐ Lead/Responsible department
- ☐ Implementation schedule
- ☐ Implementation status
- ☐ Environmental review for required studies and approvals

## **Plan Maintenance and Adoption**

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The Pre-Disaster Hazard Mitigation Plan is intended to be a living document that informs stakeholders about hazard mitigation projects and plans undertaken by Montrose County. Montrose County understands the need to regularly review and update this Plan based on

- ☐ Evolving hazards
- ☐ New mitigation techniques
- ☐ Changes in land use and
- ☐ Critical infrastructure

This review and update occurs on a schedule that meets the minimum provisions, rules and laws regulating hazard mitigation planning. This section provides a general overview of Montrose County's maintenance process.

### **Mitigation Update Committee**

Montrose County has designated the Local Emergency Planning Committee to participate in any future updates of this plan. These individuals will:

- ☐ Guide plan maintenance
- ☐ Update activities
- ☐ Ensure that information is current
- ☐ Disseminate information to other stakeholders

### **Public Participation in Plan Maintenance**

Although the Committee members represent jurisdictions and agencies, Montrose County understands the importance of direct public input to updating the Plan. To facilitate public involvement of the plan maintenance process, some of these ways to encourage public input may include:

- ☐ Copies of the Plan staged at public libraries and other government buildings
- ☐ Articles in the local newspapers
- ☐ Information about the plan and copies posted on the County website
- ☐ Public meetings prior to the adoption of any Plan updates
- ☐ Comments made from any of these sources incorporated into the Plan as appropriate

Montrose County did allow the public to comment by the above measures and will use the same methods for any and all updates made to this Plan.

### **Annual Plan Review**

The Plan will be reviewed by the Committee annually or when:

- ☐ Determined by the Local Emergency Planning Committee
- ☐ Significant changes occur within the planning area involving a threatened impact or potential impact
- ☐ Changes occur to mitigation actions that are part of the Plan

As part of the annual Plan review, these members will follow a process that:

- ☐ Requests input from project stakeholders not represented, including member of the public. This input will include information on projects and programs important to mitigation planning.
- ☐ Makes minor adjustments to the Plan to keep mitigation items aligned with approved goals and actions
- ☐ Allows for a formal approval process for major changes to the Plan
- ☐ Makes change suggestions, as appropriate, to the Committee

### **Plan Review Criteria**

The Planning Team has defined initial criteria for evaluating the Plan, and these criteria will be modified and approved by the Local Emergency Planning Committee as appropriate. When evaluating the Plan, the following items will be assessed:

- ☐ Mitigation goals and objectives address current and expected conditions
- ☐ The nature and magnitude of threats have changed
- ☐ Current resources are appropriate for implementing the Plan
- ☐ The mitigation actions underway continue to be compatible with STAPLEE criteria and any other criteria deemed relevant
- ☐ The maintenance process includes a cross-functional set of participants, including members of the public and jurisdictions
- ☐ Mitigation actions encounter problems in implementation
- ☐ Mitigation actions are achieving outcomes as planned
- ☐ Mitigation actions are coordinated with other planning studies, reports and programs in effect in Montrose County

Montrose County's Local Emergency Planning Committee meets monthly, and during these meetings will periodically ensure that mitigation actions are incorporated into on-going planning activities. For instance certain mitigation actions affect Montrose County's

- ☐ Land Use Regulations
- ☐ Capital Improvements plans
- ☐ Wildfire plans
- ☐ Others

Following the adoption of this Pre-Disaster Hazard Mitigation Plan, the committee will work with agencies and departments within the County to align mitigation actions recommended in this Plan to these policies, plans and regulations, some of which were

identified in this document. Montrose County believes that this process will allow the Plan to effectively address the hazard mitigation requirements within the planning area and incorporate input from a broad cross section of stakeholders, including community members.

## **Plan Adoption**

Montrose County will adopt the plan according to this general process:

- ☐ Posting of the draft plan with a public notice to allow community members to review and comment on the plan prior to adoption
- ☐ Final adoption by the Board of County Commissioners at a meeting

The public posting of the draft Plan will occur using an Internet posting to the Montrose County website as well as distribution to public libraries and other government office buildings. Announcements of the public postings will be made through local newspapers as well as the Montrose County website.

The actual adoption process of the document by the Board of Montrose County Commissioners will follow standard procedures:

- ☐ Reviewed and approved by Montrose County Attorney
- ☐ Posted on agenda for Board of County Commissioners regular meeting
- ☐ Public hearing
- ☐ Adoption of resolution, if no comments, which approves the Pre-Disaster Hazard Mitigation Plan
- ☐ Recorded with Montrose County Clerk and Recorder
- ☐ Posted to Montrose County website
- ☐ Press release to all major news outlets

Every five years the updated plan will be re-submitted for adoption following the general process outlined, or the processes in place established by State or Federal guidelines.

## Appendix A ~ Mitigation Actions

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This appendix describes mitigation actions and associated goals and objectives for the prioritized hazards adopted by Montrose County. The hazards identified for mitigation include:

- ☐ Severe Weather
- ☐ Wildfire
- ☐ Floods
- ☐ Hazardous Materials ~ Uranium
- ☐ Geological Hazards

The Planning Team did a cost-benefit analysis on these mitigation actions. The Planning Team listed each action; however, even though not all were cost effective. The costs were listed by subject-matter experts in these areas.

These actions reduce the effects and impacts on new and existing buildings and infrastructure throughout Montrose County.

The mitigation actions listed below are functional in nature and are actions intended for Montrose County. Each community is aware that they can apply for funding for which it is eligible. As Montrose County is a rural/frontier area, the actions, many of which are dependent on funding, will be coordinated between the County and the specific jurisdiction it affects at the time of anticipated implementation.

Such actions are not limited to just an individual jurisdiction; therefore, the actions below are encompassing for all partners associated with the development of this Plan making the neighboring projects collaborative in order to be most effective.

All Listed Hazards				
Goal	Work more closely with the public			
Objective	Create and implement a public information/ education program			
Cost	Mitigation Actions	Priority	Responsible Department	Timeline
\$20,000	Create kiosks to include telephones, maps and phones	High	PIO Group	Medium-range
\$2,500 per time	Public information campaign on where shelters are located and what to do with pets and livestock	Medium	PIO Group	Sustained
\$2,500 per time	Public information campaign on 72-hour kits	Medium	PIO Group	Sustained
\$2,500 per time	Increase public information and education on potential	Medium	PIO Group	Sustained

	for emergencies within Montrose County			
Now included in current system	Sustain technology to send emergency text messages to cell phones	Low	Emergency Management Coordinator	Sustained
<i>Objective</i>	<i>Improve response time for special needs population</i>			
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
\$5,000 per year	Website for special needs population to register information: where live, medications, etc.	High	Health & Human Services	Medium-range
Salary of employee	Map all of registrants on map	Medium	GIS	Long-range

<b>Severe Weather</b>				
<b>Goal</b>	<b>Minimize the impact of severe storms</b>			
<i>Objective</i>	<i>Become a Storm Ready community</i>			
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
Salary of employee	Write and implement plans for Storm Ready designation	High	Emergency Management Coordinator	Short-term
<i>Objective</i>	<i>Purchase Equipment</i>			
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
\$800,000	Purchase large snow blower for Road & Bridge for the Department to clear major arterials more quickly	Medium	County Engineer	Medium-range

<b>Wildfire</b>				
<b>Goal</b>	<b>Reduce impact of wildfire</b>			
<i>Objective</i>	<i>Write, update and implement plans</i>			
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
\$65,000	Write Community Wildfire Protection Plans to be	High	USFS/CSFS/BLM/ Fire	Short-term

	incorporated into the Montrose County Fire Plan		Districts/ Emergency Management Coordinator	
Salary of employee	Implement defensible space for Wildland Urban Interface in Land Use Regulations	High	Land Use	Medium-range
Salary of employee	Implement specific road codes in Land Use Regulations: <input type="checkbox"/> width to handle emergency vehicles <input type="checkbox"/> more than one access into subdivisions	Medium	Land Use	Medium-range
\$2,500	Implement a defensible space education component	Medium	USFS/CSFS/ BLM/ Fire Districts/ Emergency Management Coordinator	Short-term
<i>Objective</i>	<i>Improve geographic information data in GIS Department</i>			
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
\$100,000	Collect GPS points and structure survey information for all properties in the prioritized areas	High	GIS	Short-term; sustained
<i>Objective</i>	<i>Implement a fuels treatment program</i>			
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
	Rent equipment to allow Montrose County citizens to bring slash to an area for a set time	High	Engineer	Medium-range

<b>Floods</b>				
<b>Goal</b>	<b>Minimize the impact of floods</b>			
<i>Objective</i>	<i>Stay in compliance with National Flood Plain Insurance Program</i>			
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
Current permit fees offset costs	Continue to comply with National Flood Plain Insurance Program by identifying flood plains on new subdivision plats	High	Flood Plain Manager	Sustained



<i>Objective</i> <i>Improve flood plain mapping</i>				
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
\$500,000	Improve flood plain mapping	High	GIS/ City & County Engineer	Medium-range
\$500,000	Study the hydrology of creeks	Medium	City & County Engineer	Long-term
<i>Objective</i> <i>Implement Capital Improvement Plan in Road and Bridge Department</i>				
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
\$600,000	Raise Blossom Road Bridge	Medium	County Engineer	Medium-range
\$600,000	Raise La Salle Bridge	Medium	County Engineer	Medium-range
\$300,000	Engineer flooding issues on 6900 Road	Medium	County Engineer	Short-term
\$150,000 each	Install larger culverts at 4 locations within City of Montrose	Medium	City Engineer	Medium-range
<i>Objective</i> <i>Update Emergency Action Plans</i>				
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
\$22,000 per EAP	Hire a contractor to work with dam owners in County to update Emergency Action Plans to include flood inundation maps	High	Division of Water Resources/ Dam owners/ Emergency Management Coordinator	Medium-range

<b>Hazardous Materials ~ Uranium</b>				
<b>Goal</b>	<b>To reduce the impact from Hazardous Materials in the West End</b>			
<i>Objective</i>	<i>To improve County Roads on West End for traffic of Hazardous Materials</i>			
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
\$350,000 per mile	Improve County Roads on West End so they are built to handle increased truck traffic	High	County Engineer	Medium-range

<b>Geological hazards</b>				
<b>Goal</b>	<b>To reduce the impact from geological hazards</b>			
<i>Objective</i>	<i>To rework Land Use documents to include mitigation techniques for Geological Hazards</i>			
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
Staff salary	To include information relating to Geological Hazards into Master Plan	High	Land Use/ Planning Commission/ Board of County Commissioners	Short-term
Staff salary	To incorporate new Master Plan and Geo Hazards report information into new Building and Zoning Codes	High	Land Use/ Board of County Commissioners	Long-term
<i>Objective</i>	<i>Create and implement a public information/ education program</i>			
<b>Cost</b>	<b>Mitigation Actions</b>	<b>Priority</b>	<b>Responsible Department</b>	<b>Timeline</b>
\$2,500	To inform public	High	Land Use/ PIO Group/ Emergency Management Coordinator	Short-term

## **Attachment #1 ~ Resolution**

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A draft resolution for adoption of this plan by the Montrose County Board of Commissioners is included in this attachment.

**RESOLUTION  
OF  
THE MONTROSE COUNTY BOARD OF COMMISSIONERS  
CONCERNING: Pre-Disaster Hazard Mitigation Plan**

**WHEREAS**, Montrose County is threatened with increasing numbers of natural and technological emergency situations, and if one were to happen in Montrose County, in order to receive reimbursement from the Federal Emergency Management Agency (FEMA) after a disaster, the Pre-Disaster Hazard Mitigation Plan must be completed and adopted; and

**WHEREAS**, emergencies have become more frequent and more complex, involve more Departments, impact more people, and involve more detailed coordination than in previous times in Montrose County's history; and

**WHEREAS**, emergencies and disasters are a fundamental responsibility of governmental agencies whose main purpose is to protect citizens from collective harm. In accordance with C.R.S. 24-32-2107(9), as amended, each political subdivision in the State of Colorado is responsible for emergency management functions.

**NOW THEREFORE BE IT RESOLVED**, that the undersigned Board of County Commissioners of Montrose County, Colorado, does hereby accept the Pre-Disaster Hazard Mitigation Plan, as it was deemed "approvable" by FEMA.

Approved and adopted this    day of

BOARD OF COUNTY COMMISSIONERS,

\_\_\_\_\_  
Gary J. Ellis, Chairman

\_\_\_\_\_  
William N. Patterson, Vice-Chairman

\_\_\_\_\_  
Allan J. Belt, Commissioner

ATTEST:

\_\_\_\_\_  
Deputy Clerk to the Board

## **Attachment #2 ~ Meeting Agendas**

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The following are meeting agendas for the Pre-Disaster Hazard Mitigation Plan.

**Hazard Mitigation Plan**  
**June 4, 2008**  
**2-4 p.m.**  
**Resource Room**

1. Hazards within the County
  - List all potential hazards
  - List hazards with greatest risks
  - History of hazards within County (homework)
2. Where the populations meet that hazard
  - Wildland Urban Interfaces
  - Flood Plain
3. Types and numbers of structures in that area
  - Values of those structures (homework)
  - Projected growth in those areas (homework)
4. Other plans that discuss the hazard
  - For Example: (homework)
    - Master Plan
    - Community Wildfire Protection Plans
    - Watershed plans
5. Next Meeting Date
  - Deliverables for that meeting:
    - ☐ History of hazards
    - ☐ Value and types of structures
    - ☐ Projected growth
    - ☐ Other plans that discuss this hazard

**Hazard Mitigation Plan  
June 25, 2008  
2-4 p.m.  
Resource Room**

1. Review of hazards
2. Review of maps
3. Homework assignments
  - a. History of the hazards (Robyn, Vernon Estes~ Wildfire)
  - b. Values and Types at Risk (Brad Hughes)
  - c. Plans that discuss the Hazard (Keith Caddy, Steve White)
4. Probability of each hazard
5. Impact of the hazard
  - a. Economic
  - b. Social
  - c. Historical
  - d. Other
6. Mitigation Strategies for each hazard identified

### **Attachment #3 ~ Survey Results**

The following is a copy of the survey, which was posted to the Montrose County website, as well as the results of the survey.





Montrose County is participating in a federally-funded effort in accordance with the Disaster Mitigation Act of 2000 to develop a pre-disaster hazard mitigation plan to reduce risk from natural hazards. The input of all County residents is sought through this public survey about potential natural hazards.

This survey is available on the Montrose County website or copies are at the Montrose County Administration Building, 161 S. Townsend, or the Courthouse Annex in Nucla.

Your participation in this survey is greatly appreciated and will contribute to the quality of the County's emergency planning efforts.

**This survey will be available from July 28 through Aug. 8, 2008**

*Please circle or check the most appropriate answer:*

Are you 18 years or older	Yes/ No
Where do you reside	City of Montrose Town of Olathe Town of Nucla Town of Naturita Unincorporated Montrose County, East End Unincorporated Montrose County, West End
Are you an Emergency Response Professional	Yes/No
If yes, are you	Firefighter Law Enforcement Officer EMS Healthcare professional Sheriff's Posse Other Public Safety

Continued on next page

In your opinion, which of the following natural hazards and the potential consequences most threaten life, health and property in Montrose County?

**Please rate each hazard from 1 to 10**

**1 = Least Threatening**

**10 = Most Threatening**

Wildfire	1	2	3	4	5	6	7	8	9	10
Seasonal flooding (melting snow, seasonal rain)	1	2	3	4	5	6	7	8	9	10
Flash flooding	1	2	3	4	5	6	7	8	9	10
Landslides	1	2	3	4	5	6	7	8	9	10
Avalanche	1	2	3	4	5	6	7	8	9	10
Drought	1	2	3	4	5	6	7	8	9	10
Tornado	1	2	3	4	5	6	7	8	9	10
High Winds	1	2	3	4	5	6	7	8	9	10
Earthquake	1	2	3	4	5	6	7	8	9	10
Dam Breach	1	2	3	4	5	6	7	8	9	10
Hazardous Materials ~ Uranium	1	2	3	4	5	6	7	8	9	10
Microbursts	1	2	3	4	5	6	7	8	9	10
Erosion	1	2	3	4	5	6	7	8	9	10
Smog	1	2	3	4	5	6	7	8	9	10
Debris Flow	1	2	3	4	5	6	7	8	9	10
Pandemic	1	2	3	4	5	6	7	8	9	10
Hail	1	2	3	4	5	6	7	8	9	10
Severe Snow storms/ blizzards	1	2	3	4	5	6	7	8	9	10
Subsidence	1	2	3	4	5	6	7	8	9	10
Lightning	1	2	3	4	5	6	7	8	9	10
<b>Other Hazards, please list and rank</b>										
	1	2	3	4	5	6	7	8	9	10
	1	2	3	4	5	6	7	8	9	10
	1	2	3	4	5	6	7	8	9	10
	1	2	3	4	5	6	7	8	9	10
	1	2	3	4	5	6	7	8	9	10

**Please return this survey to**

Robyn Funk

Montrose County

Emergency Management Coordinator

161 S. Townsend Avenue

Montrose, CO 81401

[rfunk@co.montrose.co.us](mailto:rfunk@co.montrose.co.us)

The survey was posted on the website for 2 weeks, and a story about the survey appeared in the local newspapers. The purpose of this survey was to collect public input on risks from natural hazards that could affect Montrose County residents. This survey was accessible through the Montrose County website as well as in hardcopy forms that were available at Montrose County Administration and the Courthouse Annex in Nucla.

Results from the survey are listed. This information was used to guide the Montrose County planning efforts; however, it will not be used as a determining factor in determining the investment strategy for mitigation. In some cases, mitigation activities will not produce adequate benefits compared to implementation and maintenance costs. This survey was used; however, to provide general guidance to planning activities related to this Pre-Disaster Hazard Mitigation Planning initiative.

The results were tabulated according to area, and ranked on a scale from 1 to 10, with 10 describing hazards with the most impact on Montrose County. The values shown represent the average ranking for each hazard from all respondents.

Hazards listed first are those the Planning team elected to prioritize for remediation in this plan. Emergency responders were asked to identify themselves as part of the survey, and this class of survey respondent comprised of approximately 10 percent of the survey takers.

Jurisdiction	Number of surveys returned	Averages								
		Wildfire	Seasonal Flooding	Flash Flooding	Landslide	Avalanche	Drought	Tornado	High Winds	Earthquake
City of Montrose	41	6.83	5.03	4.58	3.15	2.55	6.78	2.80	6.15	3.33
Town of Olathe	4	9.00	7.00	5.25	4.75	4.50	7.00	2.25	5.50	1.67
Unincorp East	24	7.50	5.64	4.83	3.33	3.29	6.74	1.92	5.79	3.04
Unincorp West	5	7.00	5.40	5.20	6.20	3.40	5.40	4.40	5.00	4.20
Town of Nucla	3	9.00	4.00	4.00	1.33	1.33	9.33	1.33	5.33	2.33
Town of Naturita	2	4.00	2.00	5.50	5.00	1.00	7.00	2.00	7.50	1.50
Maher	1	10.00	1.00	1.00	1.00	1.00	8.00	2.00	6.00	3.00
Unknown	7	6.00	4.43	4.00	3.57	2.50	6.00	2.57	7.43	2.57
<b>Total number of surveys returned</b>	<b>87</b>									
Weighted Averages		7.10	5.11	4.63	3.44	2.79	6.74	2.53	6.06	3.08
Weighted Ranking		1	6	7	14	18	2	20	3	16

<b>Total number of surveys completed by first responders</b>	<b>9</b>
--	----------

Averages											Jurisdiction
Dam Breach	Haz Mat	Micro bursts	Erosion	Smog	Debris Flow	Pandemic	Hail	Snow	Subsidence	Lightning	
4.90	4.68	3.39	3.95	2.90	2.85	4.68	4.00	6.15	3.00	5.49	City of Montrose
5.25	7.67	5.00	4.50	3.67	3.00	5.50	4.25	6.25	2.50	5.50	Town of Olathe
3.83	4.26	3.57	3.43	2.04	3.19	4.96	4.17	6.04	2.90	5.50	Unincorp East
5.20	3.60	4.00	3.20	2.00	2.50	6.00	6.50	6.40	3.00	6.00	Unincorp West
1.00	3.33	2.00	3.00	1.00	2.33	1.50	3.67	7.33	3.67	5.33	Town of Nucla
1.50	4.50	5.00	2.00	1.50	1.50	4.50	1.50	4.50	2.00	6.00	Town of Naturita
1.00	5.00	3.00	7.00	10.00	1.00	3.00	4.00	1.00	7.00	10.00	Maher
3.67	3.57	4.00	4.00	2.43	3.14	3.00	4.43	4.86	4.50	6.43	Unknown
4.28	4.50	3.58	3.75	2.59	2.88	4.60	4.17	5.98	3.12	5.66	Weighted Averages
10	9	13	12	19	17	8	11	4	15	5	Ranking

<b>Hazards ranked by Public</b>		
<b>1</b>		Wildfire
<b>2</b>		Drought
<b>3</b>		High Winds
<b>4</b>		Severe Snow
<b>5</b>		Lightning
<b>6</b>		Seasonal Flooding
<b>7</b>		Flash Flooding
<b>8</b>		Pandemic
<b>9</b>		Haz Mat ~ Uranium
<b>10</b>		Dam Breach
<b>11</b>		Hail
<b>12</b>		Erosion
<b>13</b>		Microbursts
<b>14</b>		Landslide
<b>15</b>		Subsidence
<b>16</b>		Earthquake
<b>17</b>		Debris Flow
<b>18</b>		Avalanche
<b>19</b>		Smog
<b>20</b>		Tornado

<b>Other hazards written in by public</b>	<b>Rating</b>
Bad roads	10
Crazy people	10
General government	10
Small special interest groups	10
Political agendas	10
Rockslides	10
Haz Mat through town*	9.5
Chemical truck*	9
Walking in Montrose	9
Food Shortage	8
Non-wildfire	8
Traffic*	7.66
Front Range incident	7
Traffic accidents	7
Farm accidents	7
Crime	7
Undersized spillway at Ridgway Dam	7
Pesticide spray (ag)*	7
Large aircraft crash*	6.5
Illegal immigration	6
Disruption of water supply	5
Insects	5
Long-term power outage	5
Technological emergency	4
Large-scale prison break	4
Terrorism	3
Poisonous plants & fungi	2

\* more than one response, rating is averaged

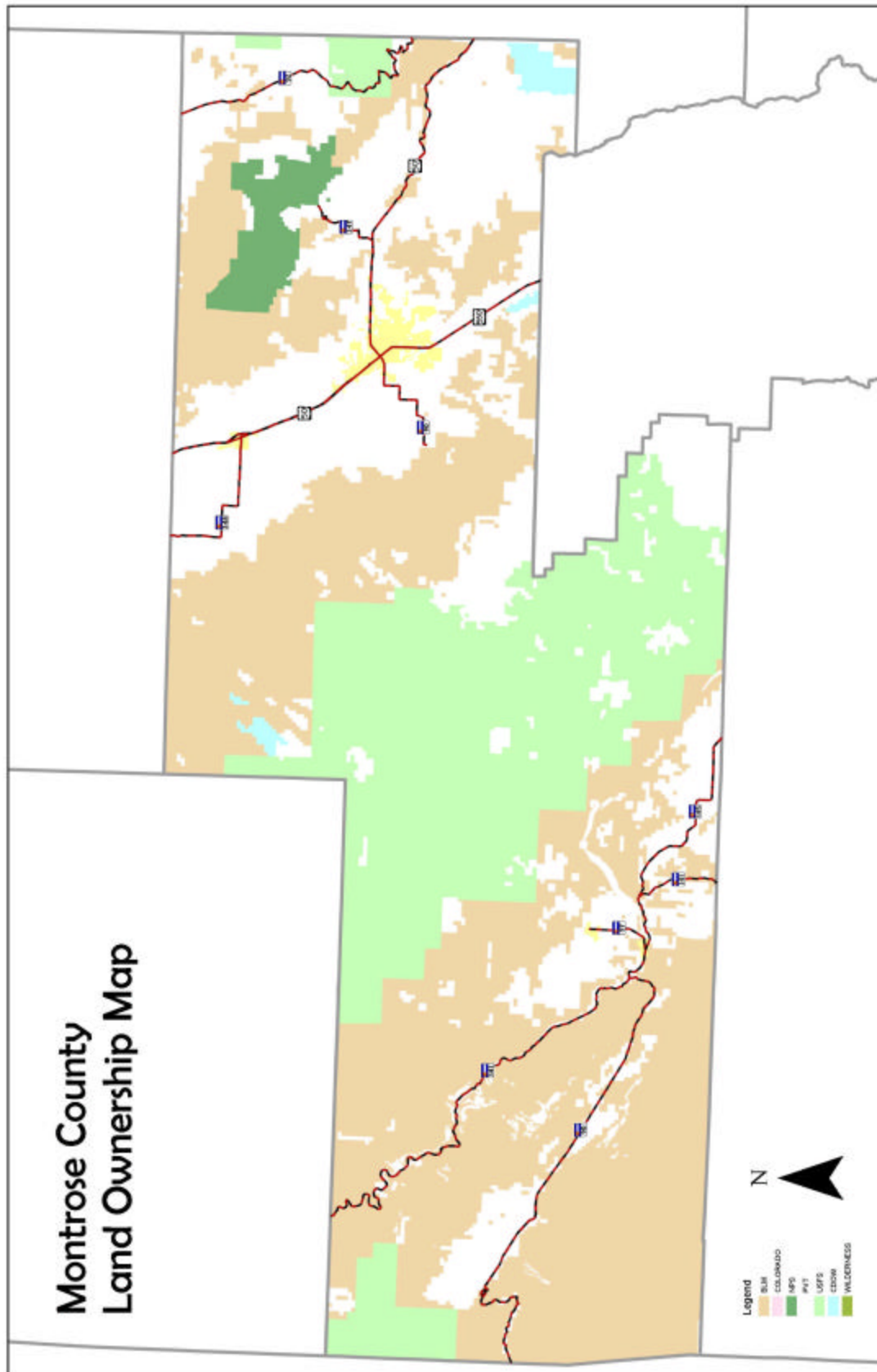
## **Attachment #4 ~ Maps**

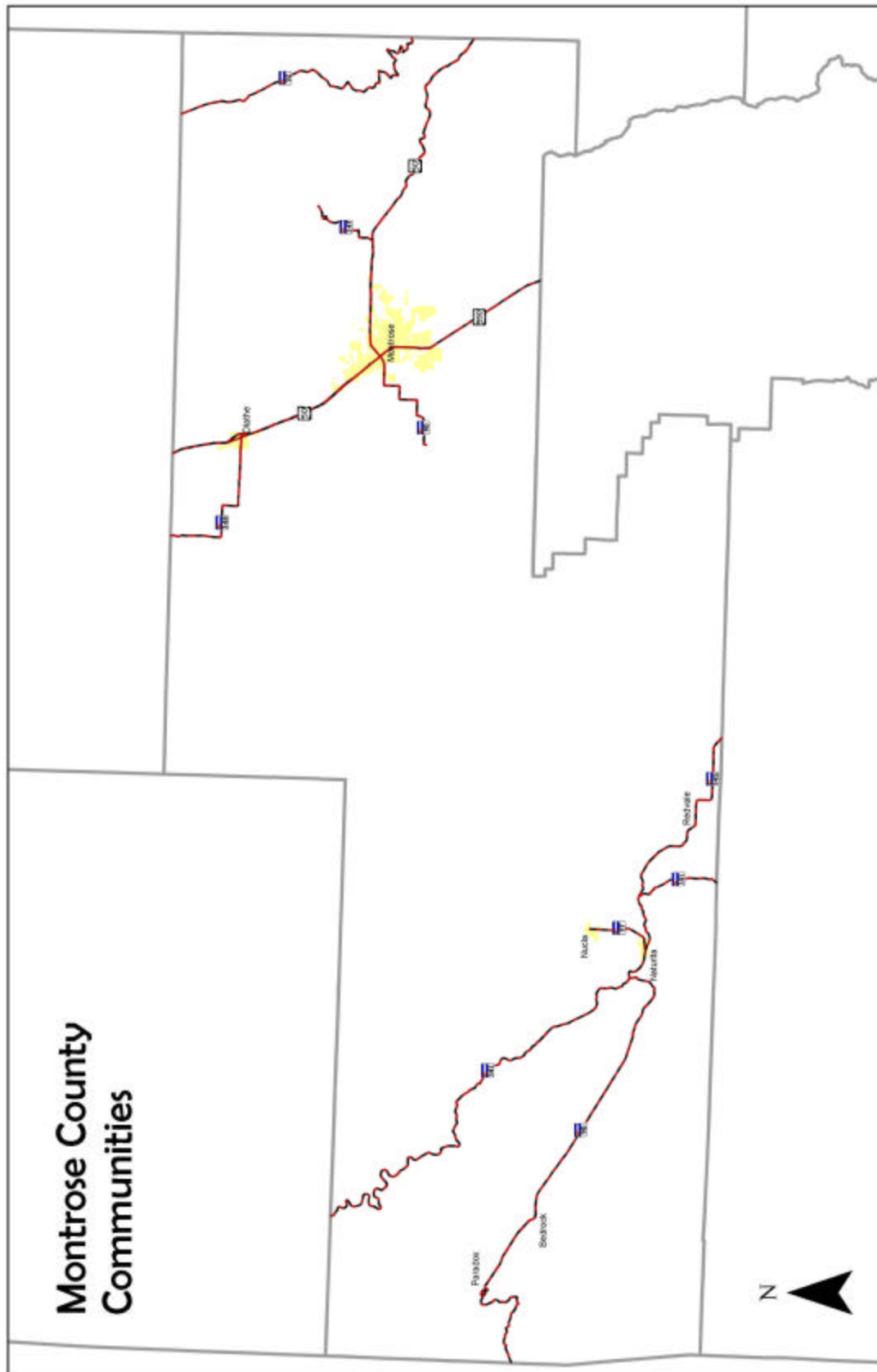
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The following maps are included in Attachment #4:

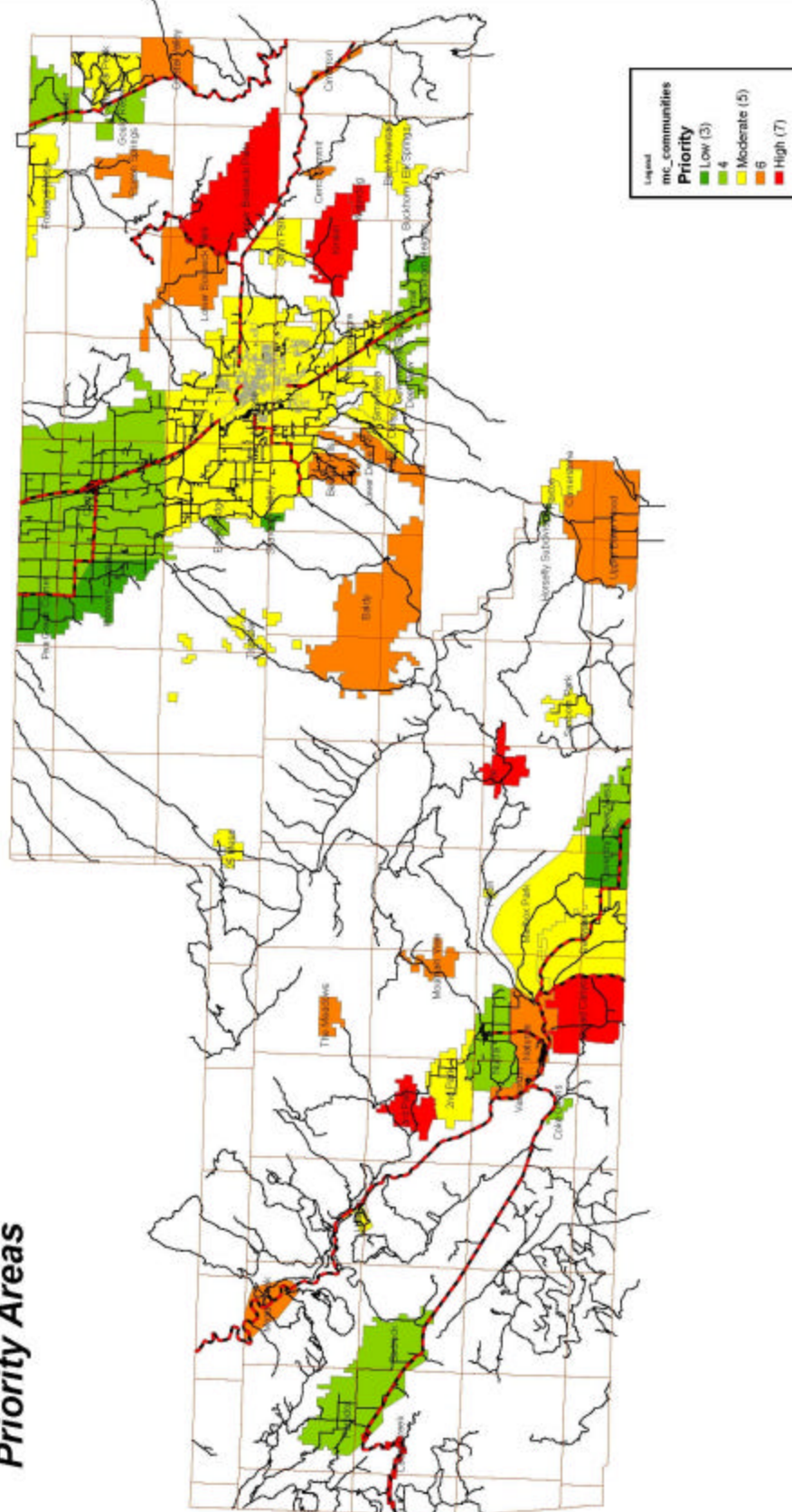
- ☐ Land Ownership Map
- ☐ Montrose County communities
- ☐ Wildfire Priority Areas
- ☐ Water Resources and Flood Maps
- ☐ Geological Hazards Maps







## Montrose County Wildfire Plan Priority Areas



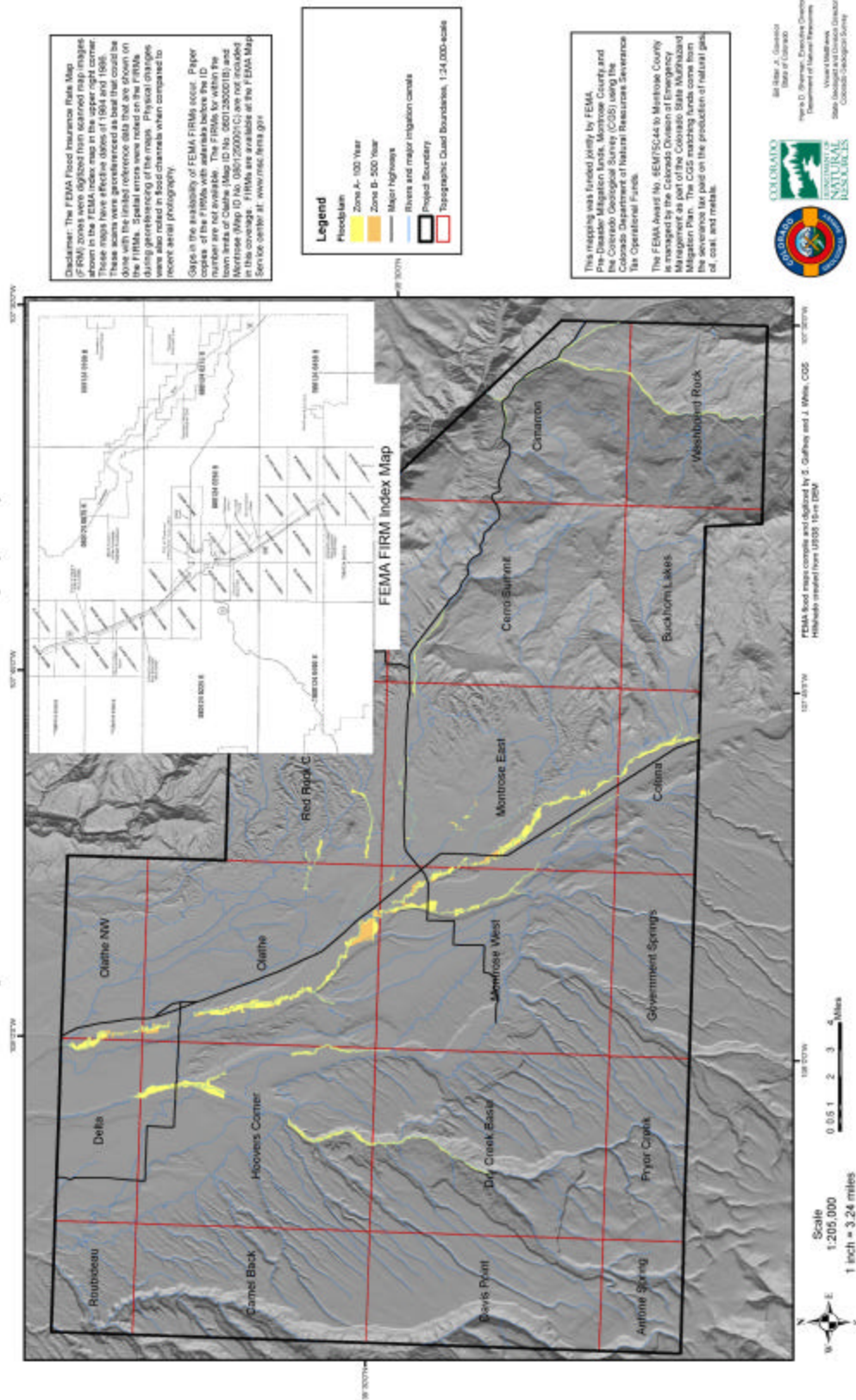
Montrose County Pre-Disaster Hazard Mitigation Plan  
Page 92



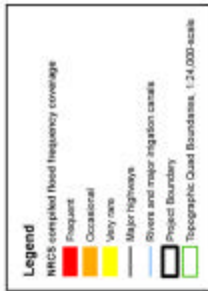


# Montrose County Geological Hazard Mapping Project Compiled FEMA Flood Insurance Rate Maps (FIRM)

## Plate 7. FEMA FIRM Maps



**Plate 8. NRCS  
Flood Hazard Map**



The Flood Frequency coverage (FloodCast) was compiled from the 250,000 data of the NRCS Soil Survey of the Rappahannock, Colorado, Parts of Delta, Guadalupe, Montrose, and Curry Counties, New Mexico. This soil survey data viewer extension for ArcGIS. This soil survey does not include the higher terrain areas of the eastern portion of the project area.

This mapping was funded jointly by FEMA, Pre-Disaster Mitigation funds, Montrose County, and the Colorado Geological Survey (CGS) using the Colorado Department of Natural Resources Severance Tax monies.

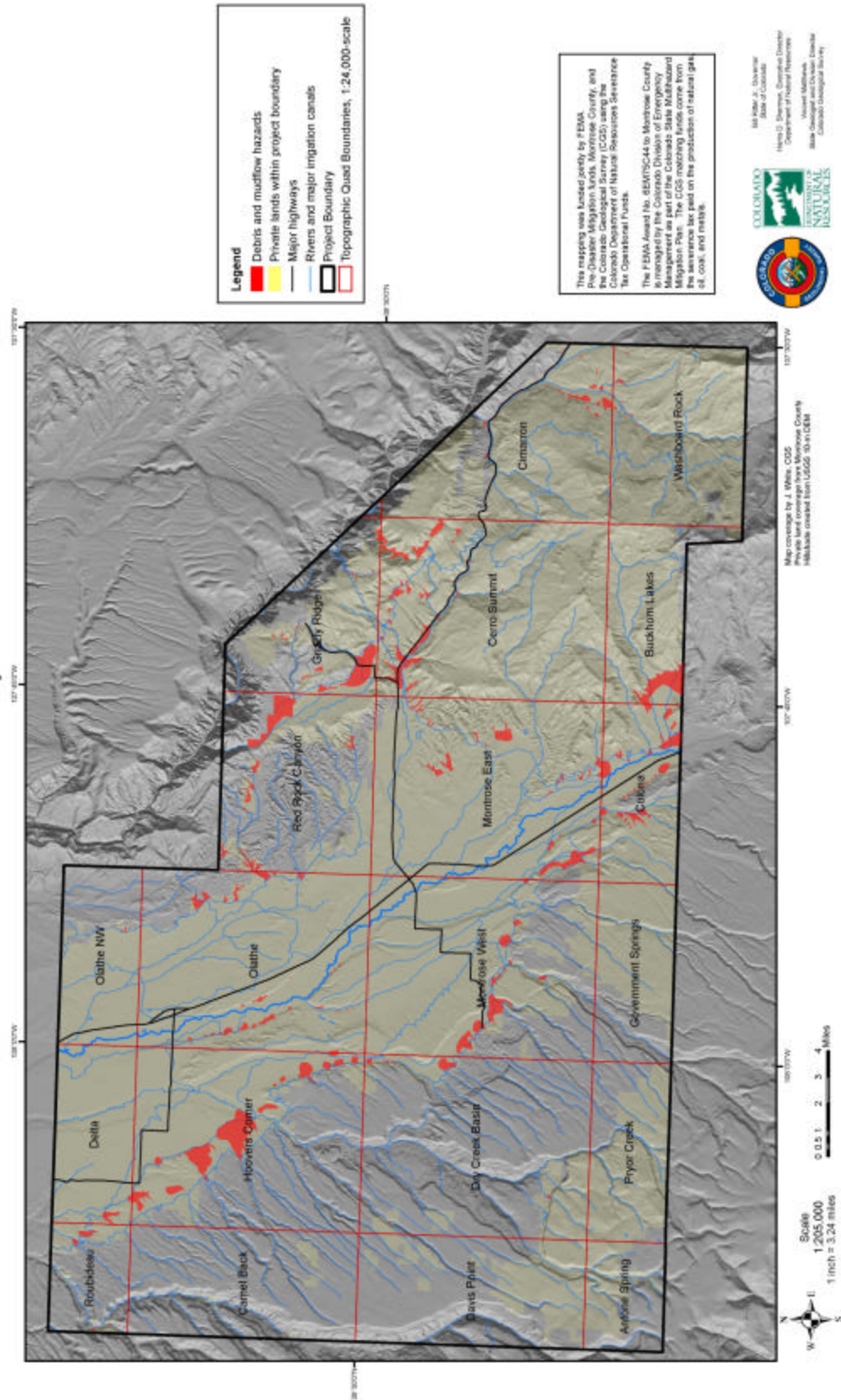
The FEMA Award No. 45EM75C44 to Montrose County is managed by the Colorado Division of Emergency Management as part of the Colorado State Multihazard Mitigation Plan. The CGS matching funds come from the severance tax paid on the production of natural gas.



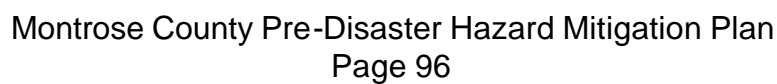


# Montrose County Geological Hazard Mapping Project Debris and Mudflow hazards on private lands

Plate 3. Debris and Mudflow Hazard Map



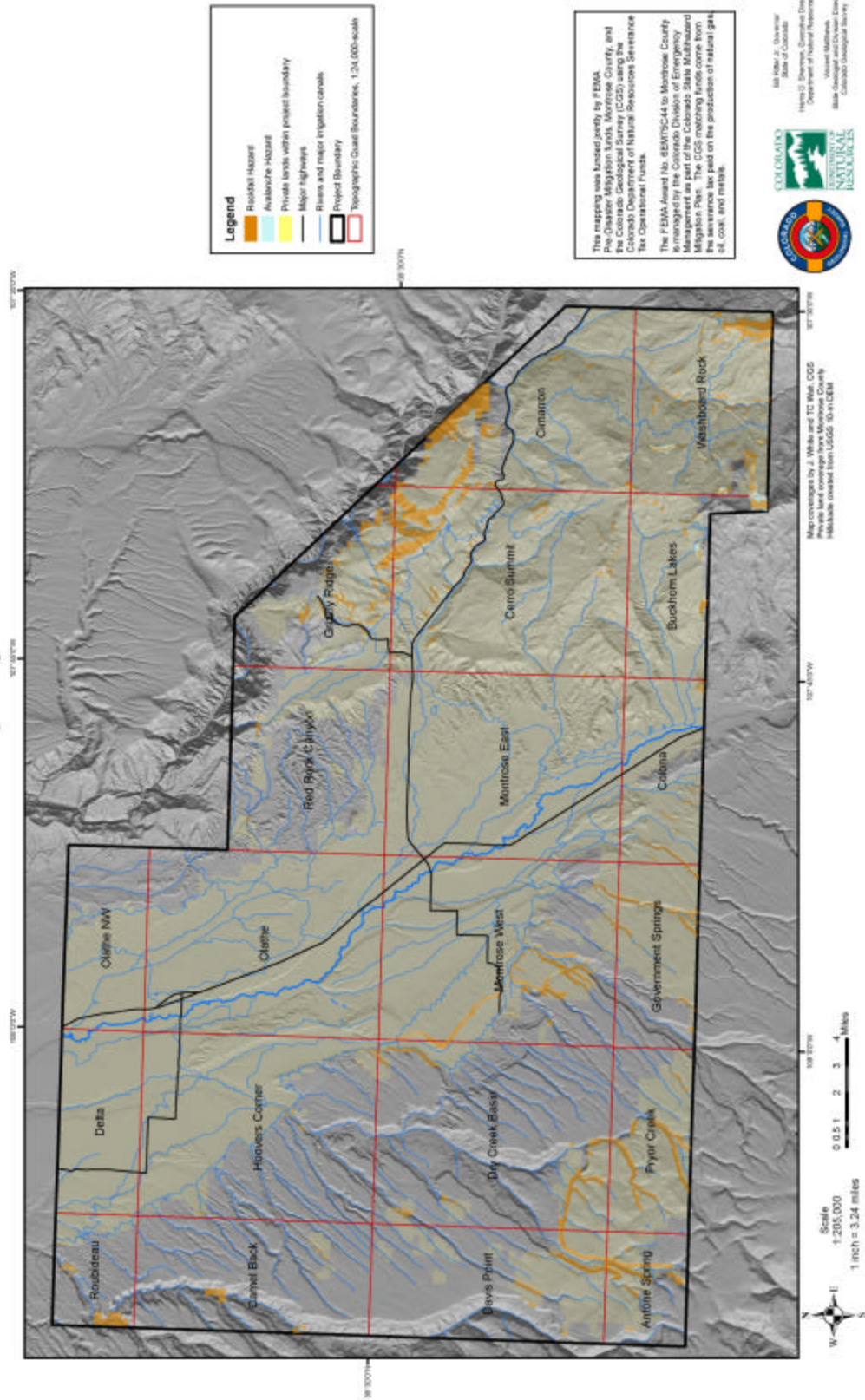
**Plate 1**  
**Landslide and Potentially**  
**Unstable Slopes Hazard Map**





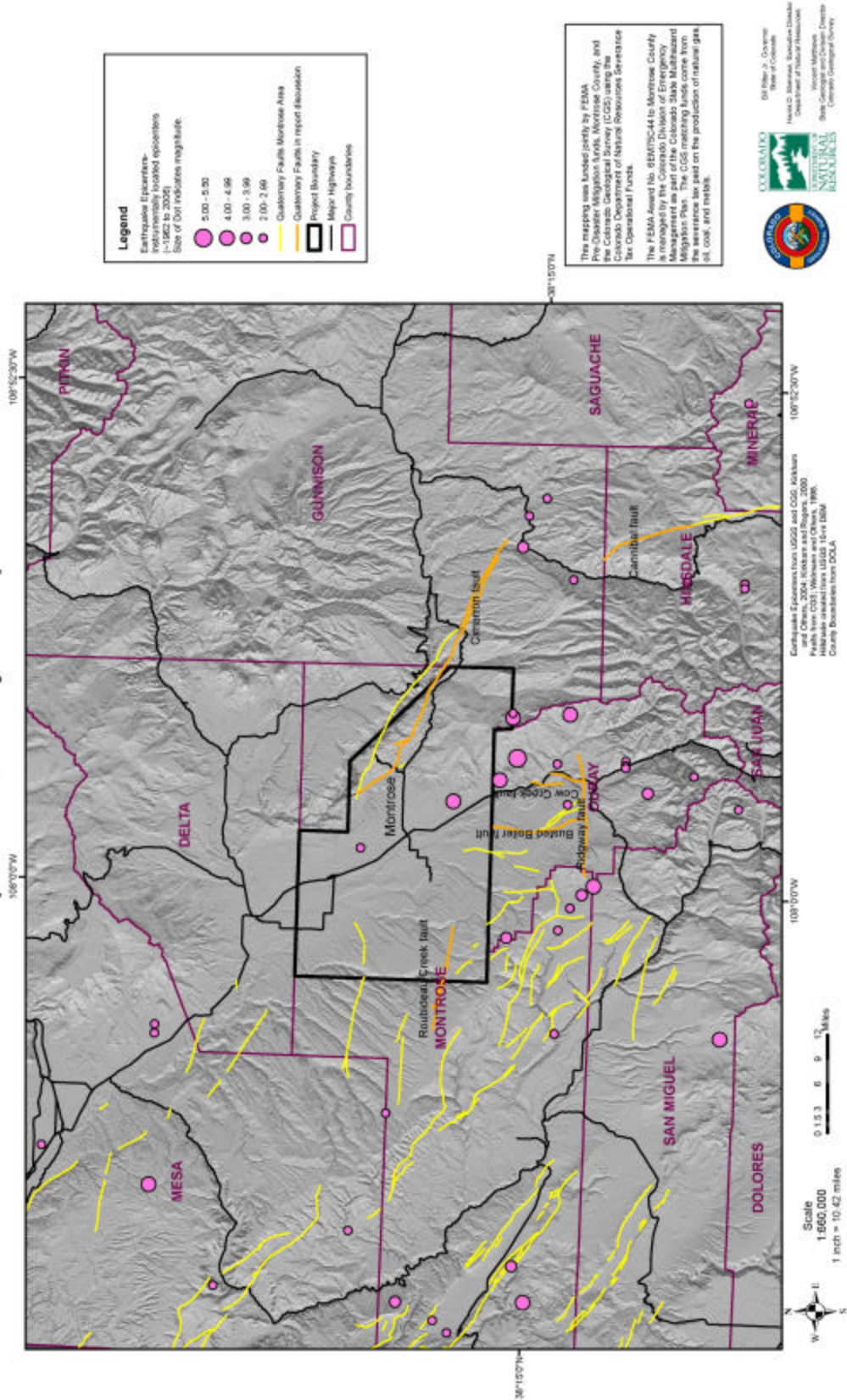
# Montrose County Geological Hazard Mapping Project Rockfall and Avalanche Susceptibility on Private Lands

Plate 2. Rockfall and  
Avalanche Hazard Map



# Montrose County Geological Hazard Mapping Project Earthquake and Quaternary Fault Map

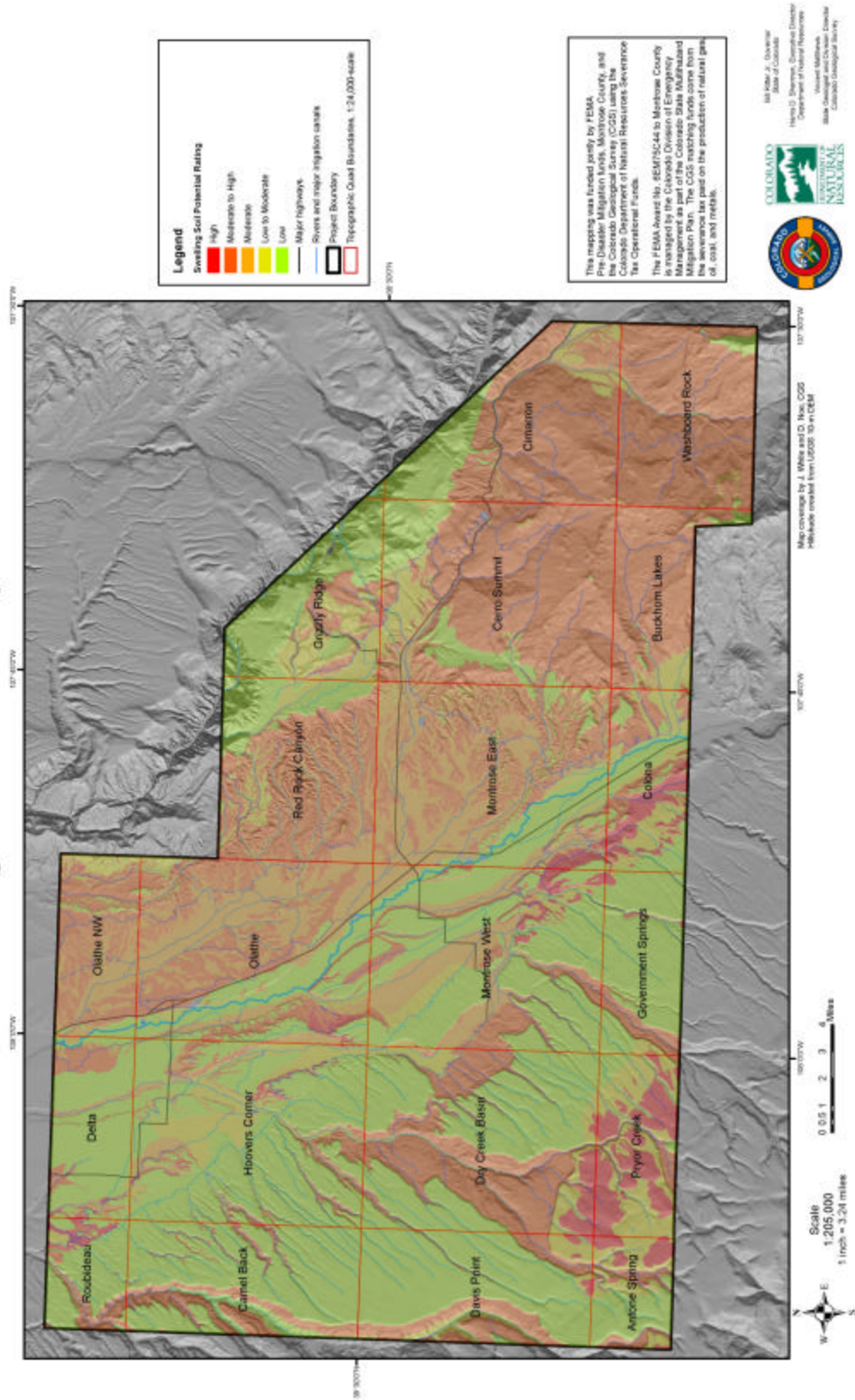
Plate 9. Montrose County  
Faults/Earthquake Map





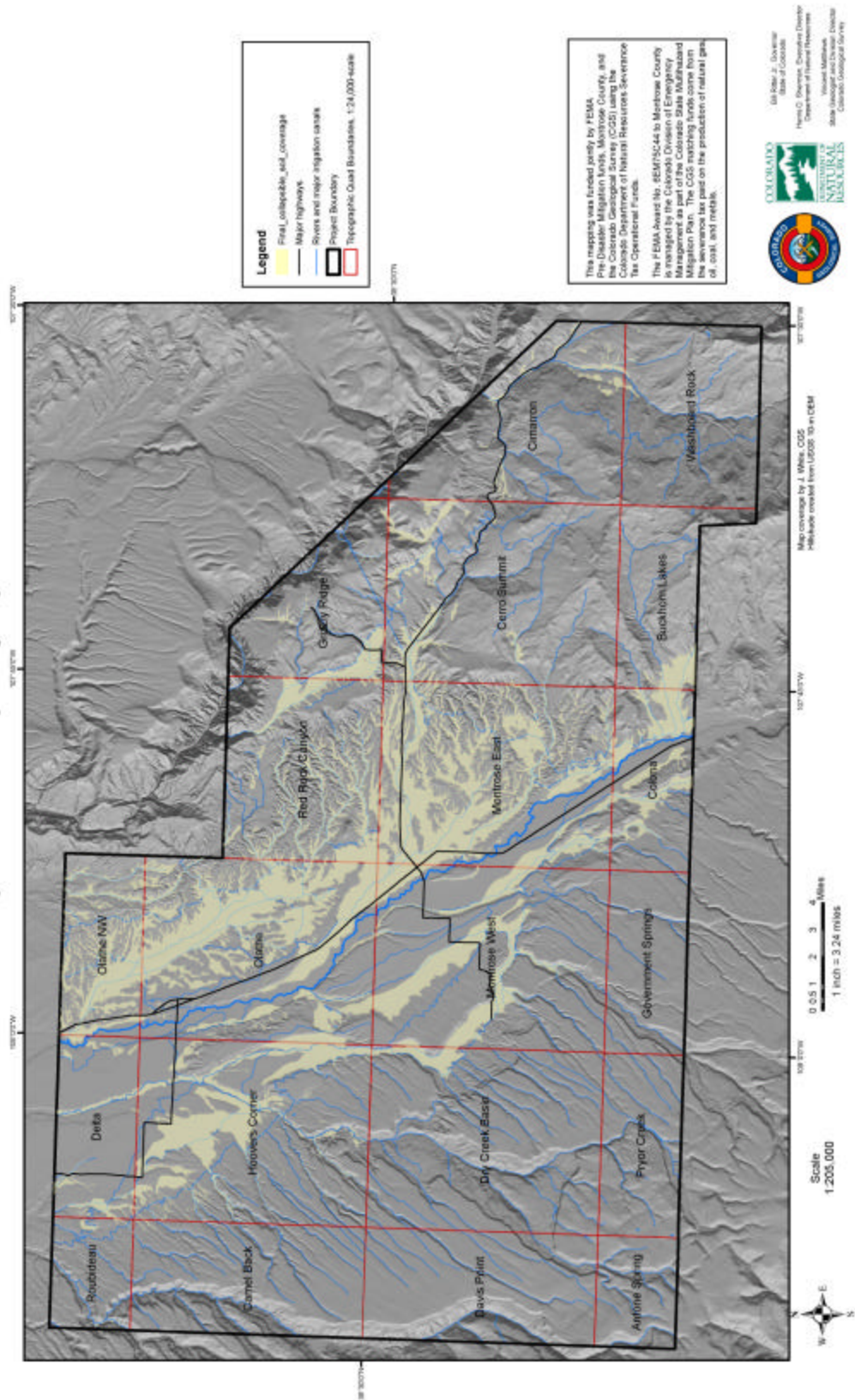
# Montrose County Geological Hazard Mapping Project Swelling Soil Potential Hazard Map

Plate 4. Swelling Soils Map



# Montrose County Geological Hazard Mapping Project Collapsible Soil Susceptibility Map

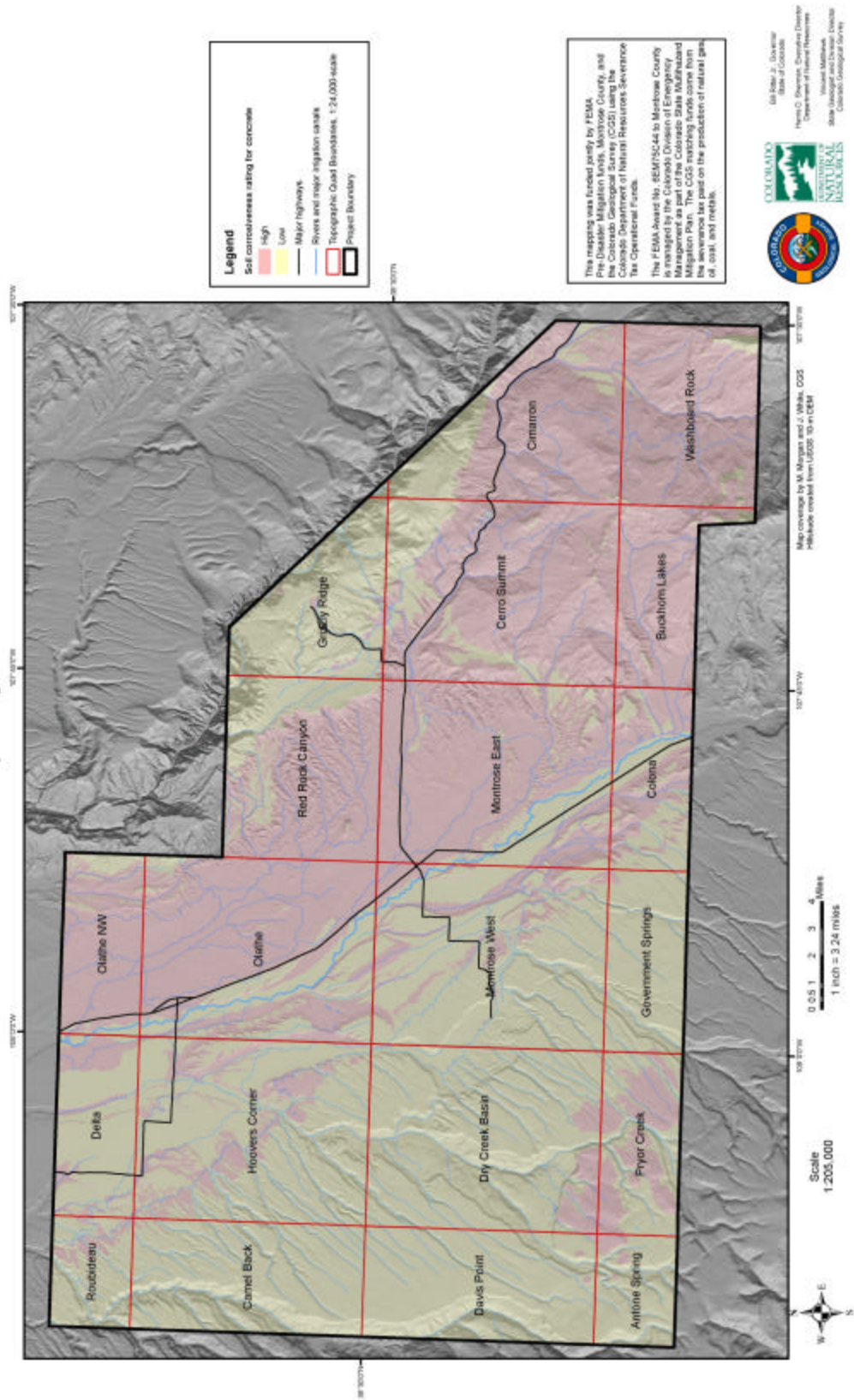
Plate 5. Collapsible Soil  
Susceptibility Map





# Montrose County Geological Hazard Mapping Project Corrosive Soil Susceptibility to Concrete

Plate 6. Corrosive Soil  
Susceptibility Map



**Plate 10. Mancos Shale, Salt  
Precipitate, and Selenium  
Impairment Map**



## Attachment #5 ~ STAPLEE

STAPLEE Action Evaluation Table																								
<div>STAPLEE Criteria Considerations</div> <div>+ Favorable   - Less Favorable   N Not Applicable</div>																								
Alternative Actions		Social		Technical			Admin-istrative			Political			Legal			Economic			Environmental					
		Community acceptance	Effect on segment of Population	Technically feasible	Long-term solution	Secondary impacts	Staffing	Funding allocation	Maintenance/ Operations	Political support	Local champion	Public support	State authority	Existing legal authority	Potential legal challenge	Benefit of action	Cost of action	Contributes to economic goals	Outside funding required	Effect on land and/or water	Effect on endangered species	Effect on HazMat/ waste sites	Consistent with community goals	Consistent with federal laws

## **Attachment #6 ~ References**

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The following were used as references to write the Montrose County Pre-Disaster Hazard Mitigation Plan:

- ☐ Colorado Climate Center
- ☐ Colorado Division of Emergency Management Mitigation Plan
- ☐ Colorado Division of Emergency Management website
- ☐ Colorado Drought Mitigation and Response Plan
- ☐ Colorado Geological Survey
- ☐ Colorado Water Conservation Board
- ☐ Delta County Hazard Mitigation Plan Documents
- ☐ Department of Atmospheric Science at Colorado State University
- ☐ Department of Local Affairs, Energy & Mineral Impact
- ☐ Drought Draft Final Report Update
- ☐ Grand County Pre-Disaster Mitigation Plan ~ Draft
- ☐ Gunnison County All-Hazard Mitigation Plan
- ☐ <http://www.colorado.edu/hazards>
- ☐ [http://www.fema.gov/plan/mitplanning/approved\\_plans\\_reg8.shtm](http://www.fema.gov/plan/mitplanning/approved_plans_reg8.shtm)
- ☐ MSN Encarta Dictionary
- ☐ Montrose County Fire Plan
- ☐ Montrose County Master Plan
- ☐ Montrose County Wildfire Plan
- ☐ *Montrose Daily Press* website
- ☐ Montrose Historical Society
- ☐ Multi-Jurisdictional All-Hazards Pre-Disaster Mitigation Plan for Pitkin and Eagle counties
- ☐ National Weather Service
- ☐ NOAA
- ☐ San Miguel County All-Hazard Mitigation Plan
- ☐ United States Department of Agriculture
- ☐ West End Museum website
- ☐ Wikipedia



## **Attachment #7 ~ Glossary**

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**Alluvial** Relating to, consisting of, or formed by sediment deposited by flowing water.

**Ancillary** Providing support for someone or something.

**Breach** Breaking down an obstruction to allow something to pass through it.

**Causative** Involving or being the cause of something or the relationship or cause and effect.

**Collaborate** To work with another person or group in order to achieve a common goal.

**Comprehensive** Including everything so as to be complete.

**Consensus** General or widespread agreement among all the members of a group.

**Conservation** The protection, preservation, and management of natural and cultural resources.

**Constraint** The state at which freedom of action is severely restricted.

**Corridor** A narrow strip of land cleared of trees or other growth.

**Critical** Extremely important or essential that is absolutely necessary for the success of something.

**Deteriorate** To become or make something worse in quality, value or strength.

**Detrimental** Causing harm or damage to something else.

**Dispatch** Instructing someone to go somewhere to do something rather quickly, as in an emergency situation.

**Dispersive** Tending to cause the scattering or distribution of something within an area or space.

**Emphysema** A chronic medical disorder of the lungs in which the air sacs are dilated or enlarged and lack flexibility, so that breathing is impaired and infection sometimes occurs.

**Ephemeral** Lasting for only a short period of time and leaving no permanent trace.

**Erosion** The wearing away of rock or soil by physical breakdown, and transportation of materials that can be caused by water, wind, and ice.

**Exempt** Freed from or not subject to something such as taxes.

**Faults** The displacement of rock layers in the Earth's crust in response to stress, accompanied by a break in the continuity of the rocks on each side of the fault line.

**Feasible** An idea or thought that is capable of being accomplished or put into effect.

**Foundation** The part of a building, usually below ground, that transfers and distributes the weight of the building onto the ground.

**Gradient** the upward or downward slope and the rate at which the steepness of the slope increases.

**Habitat** The natural conditions and environment in which a plant or animal lives.

**Hazard** Something that is potentially dangerous or harmful, often the root cause of an unwanted outcome.

**Imminent** An event that is about to happen, or conditions are such that it is threatening to happen.

**Incident Commander (IC)** The individual responsible for the command of all emergency functions at the field level.

**Indigenous** Originating in a naturally living, growing or occurring in a region or country. Something that is natural to a place.

**Interface** The place or way in which two things act together or affect each other or the point of connection between things.

**Inundation** An accumulation of an overwhelming amount of water.

**Jurisdiction** The area over which legal authority extends.

**Liability** Legal responsibilities for something, especially for costs or damages.

**Mandate** The official command or instruction from an authority.

**Mitigation** The steps taken to make the effects of a disaster less harsh, severe or violent.

**Myriad** Comprised of many different elements.

**Nomad** A member of a people who move seasonally from place to place to search for food and water.

**Nuisance** An annoying thing.

**Overflow** To flood, cover, or flow over the surface or something; or to spread beyond the area intended to contain it.

**Percolation** To force a liquid to pass through a porous substance to filter.

**Potential** Having a latent possibility or likelihood of occurring, or of doing or becoming something.

**Preparedness** Readiness for action.

**Prominent** Something that is noticeable or conspicuous.

**Recovery** The return of something to a normal or improved state after a disaster.

**Response** Something done in reaction to something else.

**Risk** The chance of something going wrong with the danger of injury, damage or loss will occur.

**Rupture** A break in something, or a breaking apart of something.

**Salinity** Containing a high content of salt; relating to or containing alkali metal salts or magnesium salt.

**Seepage** The escape of a liquid or the amount of liquid that escapes.

**Selenium** A nonmetallic element that occurs in several forms ranging from a red powder to gray black crystal and is an essential trace element that is toxic when found in excess.

**Shearing** To cause something to deform or break by applying a twisting force.

**Stabilize** To make something stable.

**Subdivide** To divide a section of land into smaller parcels.

**Transcend** To go beyond a limit or range; to surpass something in quality or achievement.

**Unincorporated** Not organized into a corporation or municipality.

**Viscous** Thick and sticky, difficult to stir and is reluctant to flow.

**Vulnerable** Open to physical or emotional harm; unable to resist illness, debility or failure.

**Weather Spotter** A person who is trained to spot adverse weather conditions as they approach.